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Awareness and Knowledge of Dentists of Kashmir Regarding Separated Instrument Management : A Questionnaire Based Cross-Sectional Study

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Abstract

The aim of this survey was to evaluate the awareness & knowledge of dentists of Kashmir regarding separated instrument management. A modified online questionnaire comprising of demographics, knowledge and practice based questions was prepared and distributed online amongst 215 dentists irrespective of their specialty. A stipulated time of two weeks was given to receive response. The data collected was segregated and analyzed using MS excel for descriptive analysis. The response rate of 76% was achieved as 163 responses were received out of 215 participants. The survey respondents comprised of 32.5% percent of graduates, 35.5% endodontists and rest post-graduates of other specialties. Around 78.5% respondents experienced instrument separation during cleaning and shaping while 12.5 % during initial negotiation. Regarding the level of fracture inside the canal almost 71.5% observed separation in apical third of canal in mesial roots (65.6%) of mandibular molars. Most of the clinicians preferred bypassing technique (59.9%) as first line of treatment. 21.9% respondents preferred to leave the separated instrument in canal without further treatment & 8.8% clinicians opted for retrieval of separated instrument. 9.4% referred to endodontist for further treatment. Most of the respondents were aware about the basic technique and about the role of magnification in management of separated instrument although more information and training is needed to get aquanted with latest techniques and equipments for the treatment of separated instrument

Keywords:- Instrument separation, Knowledge, awareness, cleaning & shaping, root canal treatment, dental operating microscope.

INTRODUCTION

The aim of endodontic treatment is prevention and/or elimination of apical periodontitis by removing microbial infection/ necrotic pulp from root canals. This aim is achieved by cleaning and shaping which are the main determinants of successful endodontic treatment. There is a growing popularity of NiTi file systems for cleaning and shaping owing to their efficacious shaping, ease of use and reduced treatment time. Paradoxically they may fracture suddenly without any signs of fatigue unlike traditional stainless steel (SS) files.With the widespread use of NiTi instruments the incidence of there fracture

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inside root canals has also increased.The incidence of NiTi file fracture is 1.3% to 10%,[1,2] & for stainless steel (SS) files it ranges from 0.25% to 6%,[3,4] respectively. The aim of successful endodontic treatment is jeopardized when an inadvertent instrument fracture occurs and an overzealous attempt to retrieve it may lead to various complications viz; perforation, ledge, apical transportation, secondary fracture etc and hence badly affecting prognosis. Therefore proper knowledge, awareness and skill is important for the management of fractured instrument in root canal to avoid such complications and treatment failure. This study was aimed to evaluate the awareness and Knowledge of dentists of Kashmir regarding separated instrument management.

MATERIAL AND METHODS

A questionnaire based cross sectional study was carried out involving general dentists as well as specialists in Kashmir region of J&K India for assessing the awareness and knowledge of management of separated instrument in root canal. A modified online questionnaire was developed by the authors and consisted of 18 questions targeting demographics such as gender, qualification and years of experience. The second part of the questionnaire dealt with the incidence of endodontic file separation as well as the awareness and attitude of dentists towards it and the last part towards understanding of management options.The questionnaire was pre-standardized which had been previously used by Shilpa-Jain et al 2021. The data collected was segregated and analyzed using MS excel for descriptive analysis.

The questionnaire [Table 1] was prepared through google form and link generated was sent out to participants via email and whats app. A stipulated time period of 02 weeks was given to receive response and subsequent data collected was assessed. The purpose of study was clearly described in the form. A sample size of 215 was estimated out of which 163 responses were received. Dental surgeons and specialists who were not part of the operative/endodontic clinics were not included in the study

Questionare

Gender Male / Female

Qualification BDS / MDS / others(specify)

Clinical Experience <2yrs / 2-5yrs / >5yrs

Have you ever experienced instrument separation (Y/N)

1. How often do you experience instrument separation
   a) Every week
   b) Every month
   c) Rarely
2. Which type of instrument fractures commonly in your clinical setting/practice?
   a) SS Hand
   b) NiTi Hand
   c) NiTi rotary
   d) GG/peaso
   e) All
3. Do you re-use NiTi files in different patients
   a. Yes (cite reason)
   b. No (cite reason)
4. At which level of root canal do instruments usually separate?

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a. Coronal
b. Middle
c. Apical
d. All

5. At which stage of root canal treatment do you experience instrument separation commonly ?
   a. During initial negotiation
   b. During Cleaning shaping
   c. Not sure
6. What is your most probable reason for instrument separation?
   a. Root canal anatomy
   b. Improper handling of instrument
   c. multiple usage of same instrument
   d. Manufacturing defect
7. In which tooth you experience instrument separation most frequently?
   a. Incisors & Canines
   b. Premolars
   c. Maxillary Molars
   d. Mandibular Molars

8. In which canal of molars you experience instruments fracture commonly
   a. Mesial canal of Mandibular molars
   b. Distal canal of Mandibular molars
   c. Buccal canal of Maxillary molars
   d. Palatal canal of Maxillary molars

9. Do you inform your patient about instrument separation in canal?
   a. Yes
   b. NO (cite reason)
10. What is your treatment of choice for separated instrument in canal?
    a. Retrieve
    b. Bypass
    c. leave it there
    d. tooth Extraction
    e. Refer to specialist
11. At Which level of root canal is it(do u find it) difficult to retrieve fractured instrument
    a. Coronal third
    b. Middle third
    c. Apical third
12. Which technique do you prefer for retrieval of separated instrument?
    a. H-files
    b. Ultra-sonics,
    c. Instrument retrieval kit
    d. Others (specify)
13. While attempting retrieval /bypass technique, what procedural error do you most commonly encounter ?
    a. Perforation
    b. Transportation
    c. Ledge formation
    d. Over preparation of canal
14. Do you think Magnification is necessary for instrument retrieval?
    a. Yes, I use it
    b. yes, but I don't have set up
    c. No it is not needed

RESULTS

The response rate of 76% was achieved as 163 responses were received out of 215 participants.

The results were analyzed using google form and Microsoft excel sheet. 59.4% respondents were males and 40.6% were females.

The survey respondents comprised of 32.5% percent of graduates , 35.5% endodontists and rest post-graduates of other specialties.

Most of the respondents 53.1% had more than 5years of clinical experience, 31.3% had 2-5

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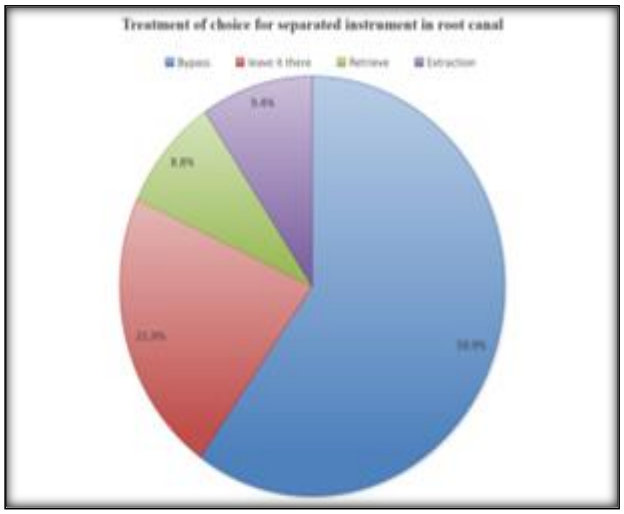
years while as 15.6 % had less than 2 years of clinical experience.

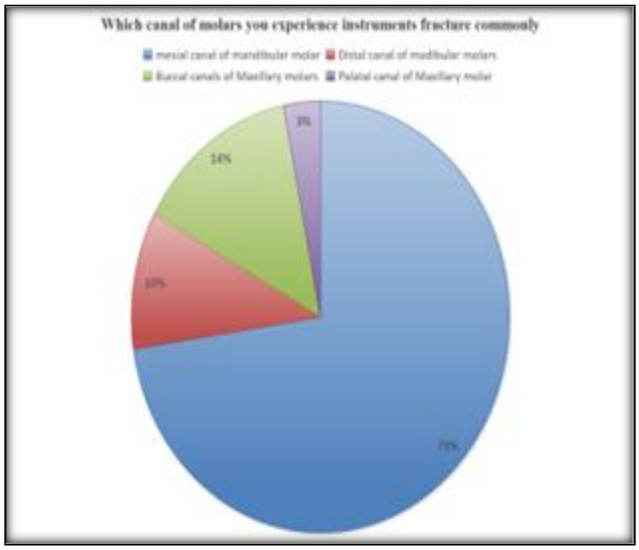
Almost all respondents(96.9%) had experienced instrument separation out of which only 71% informed the patient about it, and those who didn't inform cited patients hysterical/unpredictable behavioral response after informing them about the event as the reason for not informing.

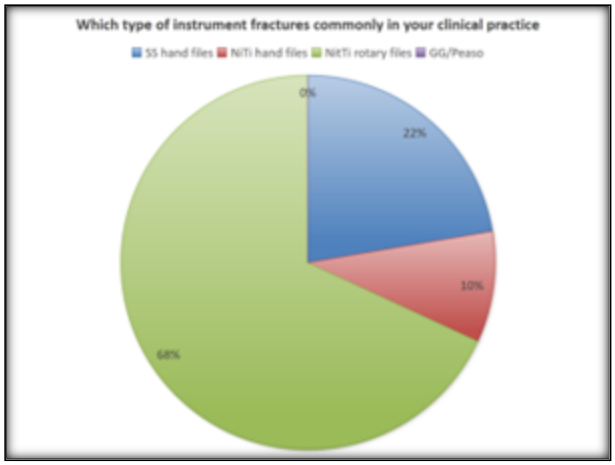
Rotary NiTi files were the most commonly fractured instrument (68%) followed by SS hand files 22% followed by NiTi hand files10%.

Around 78.5% respondents experienced instrument separation during cleaning and shaping while 12.5 % during initial negotiation. Regarding the level of fracture inside the canal almost 71.5% observed separation in apical third of canal while as 26.3% and 2.2% in middle and coronal third respectively.

Most of the respondents (59.4%) cited multiple usage of same instrument as most common reason of instrument separation while some cited root canal anatomy and improper handling as other causes 18.8% & 17.6% respectively, while as manufacturing defect was least cited reason 4.2%.







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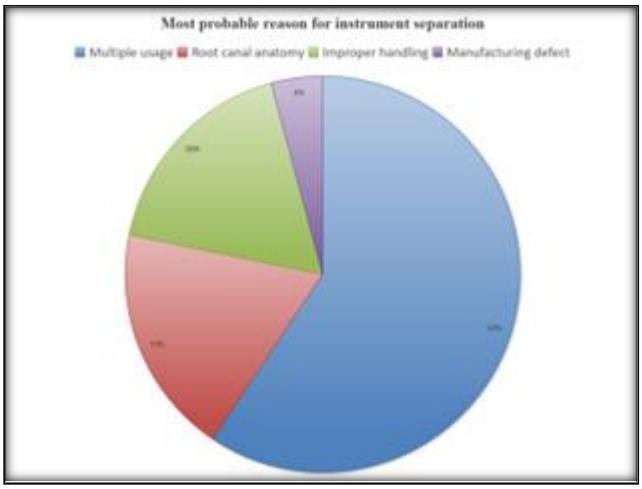

As expected mesial roots(65.6%) of mandibular molars (62.5%) were the frequently involved site for instrument separation followed by buccal canals of maxillary molars (37.5%). Incisors and canines were least involved teeth.

Most of the clinicians preferred bypassing technique (59.9%) as first line of treatment. 21.9% respondents preferred to leave the separated instrument in canal without further treatment & 8.8% clinicians opted for retrieval of separated instrument. 9.4% referred to endodontist for further treatment.

As expected apical third of canal was most difficult site for treatment followed by middle third the most preferred technique for instrument retrieval was use of ultra-sonics 40.6% followed by use of H-files 31.3% .

During treatment of separated instrument most of respondents reported Over preparation of canal as most commonly encountered procedural error (46.9%) followed by ledge formation (30.4%), perforation (18%) and transportation (4.7%) respectively. 93.6% of respondents felt that magnification was necessary for treatment of fractured instrument but only 22.6% have the necessary set up while as about 71% didn't have necessary set up.

DISCUSSION

The introduction of NiTi in endodontics has made root canal treatment less tedious but instrument fracture is one of the most annoying/common problem associated with it as it impedes complete cleaning, shaping, irrigation and subsequent obturation of root canal. This could result in decreased rate of successful out-come of endodontic therapy. Thus it is essential to have necessary knowledge regarding management of separated instrument in root canal.

In this regard a survey was conducted to have a broad view of knowledge and attitude pertaining to management of instrument separation in root canals amongst dentists of Kashmir.

Currently there isn't any officially approved protocol for the treatment of separated instrument {Triantafyllia et al 2018}

Although there are guidelines established by AAE (American association of endodontists) that help in clinical decision making for management of separated instruments.

The length and location of fragment is confirmed on periapical radiograph which is important for the treatment planing. Although cbct will reveal more information regarding same but due to financial constraints some dentists do not recommend this usually. The choice of treatment depends upon various factors amongst which the knowledge and skill

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of operator, availability of magnifications and proper armamentarium being most important.

Both surgical as well as conservative non surgical treatment options are available for management of separated instrument.

The three common approaches in non surgical management of separated fragment

(i) instrument removal (ii) Bypassing and (iii) leaving it there and obturation of coronal part

Among these bypassing is preferred as first line and safer option. In this a small gap is created between root dentin and fragment through the use of small SS hand files till working length, followed by shaping , cleaning and obturation. While as in removal of separated fragment an advanced armamentarium like Ultra-sonics, DOM and instrument retrieval kits are required to completely remove separated fragment from root canal. Entombing a fragment is also a viable option and especially useful when instrument separation occurs in last stage of treatment, separated fragment is in apical area and the involved tooth is not having any periapical lesion otherwise surgical treatment is warranted.

In our study most of the respondents (almost 96%) experienced instrument separation during rct and rotary niti were the most frequently fractured 66.8% followed by ss hand files 26.8%. this is in accordance with Madarati et al 2008 and shilpa-jain et al 2021.[5,6] Nevertheless due to the flawed reporting system it is very difficult to assess the exact incidence of separated instruments.

In the present study, most of the participants informed patients as well as their departments about the instrument separation yet significant number of operators (about 29%) shied away from informing patients about instrument separation and cited unpredictable behavioral response as the main cause . Informing the patient and department about any mishap and its prognosis is a must according to fundamental legal and ethical dental code. The results were in accordance with previous studies.[7,8,9] It is also noteworthy in this study that the incidence of instrument separation was higher in specialists and more experienced operators, reason attributed to it may be that they treat higher no of complicated cases while as graduates usually do simple cases. This is in accordance with pedir et al 2016.[10] In our study we found that 71.5% experienced instrument separation in Apical third of canal and mesial canal system of mandibular molars was the most frequently involved. This could be attributed to its narrow diameter and presence of abrupt canal curvatures in middle and apical third of root canal.[3,11,12]

According to our study results 78.5% respondents experienced instrument separation during cleaning and shaping phase of root canal treatment, and multiple usage was most common cited reason by approximately 60% of respondents , similar results were obtained/ found by Pedir et al and shilpa-jain et al. Also it was found that most of the operators do re-use NiTi files citing economical constraint as main reason. It is not recommended to re-use NiTi files to avoid cross-infection. Apart from this, re-using NiTi files after sterilization should be examined routinely under magnification before using

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them, even though NiTi files can still fracture without showing any signs of fatigue. In the present study most of the operators 59.5 preferred bypassing the separated instrument as treatment of choice, it can be attributed to the fact that most of the separations took place in later part of treatment and hence canal has widened enough already to accommodate another instrument allowing ease in bypassing. A good number of clinicians believed (21.9 %) to leave it inside canal without doing any treatment ,it may be because filling of root canals with separated files esp those at apex doesn't differ much in prognosis further it is difficult to retrieve separated instrument at this position and is usually associated with risk of complications,[13] Only 8.7 % tried to retrieve and 9.9% refer to specialist for further treatment.

As expected apically separated instruments were most difficult to retrieve and coronally separated were least difficult. For retrieval use of ultra sonics was most popular method (40.6%).

This finding is similar to the results reported earlier by Madarati et al. in the UK population (84.6%), Pedir et al. (42%) in the Riyadh population, and Al Nazhan et al. in the Saudi population (50%). Besides that other operators chose braiding techinique using H-files for 31.3%. It is noteworthy that less than 10% of clinicians were aware of (IRS) instrument retrieval sytems such as Massesranan kit , terauchi kit etc.

Modern endodontic practice involves use of Ultrasonics and IRS under DOM in management of separated instrument . Although the equipments are expensive and require fine skills but it increases the odds of successfully retrieving separated instrument and hence contributing to overall success of root canal treatment .Under DOM separated fragment is visualized by sequential use of GG drill, a fine space is troughed between separated fragment and inner curve of root canal wall and ultrasonic tip is activated. If the fragment is long >4.5mm or not retrieved by ultrasonics, Loop devices such as BTR pen is used to get hold of head of fragment and gently dislodged out of the canal.[14] The most frequently encountered error was over preparation of canal followed by ledge formation as reported by respondents in our study. This is in accordance with Madarati et al , Although Pedir et al & Shilpa-jain reported contrasting results. It must be emphasized that most of these complications can be minimized by the use of DOM.[15]

In our study most of the respondents agreed to the fact that use of DOM is essential in retrieval of separated instrument (93.6%) although most of them lacked the necessary equipment.

This study gives an important insight about the knowledge and attitude regarding the management of separated instrument in root canal , although it has some limitations such as it is confined to limited number of clinicians in particular geographic location and possibility responsive bias. Instrument separation is vexatious phenomenon, the knowledge of its management, skill and necessary armamentarium will definitely increase the successful outcome.

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CONCLUSIONS

Most of the respondents were aware about the basic technique and about the role of magnification in management of separated instrument although more information and training is needed to get aquanted with latest techniques and equipments for the treatment of separated instrument. It must be also emphasized that it is easier and important to prevent instrument fracture than performing instrument retrieval.

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