



INFORMATION REGARDING USE OF ROTARY NICKEL –TITANIUM ENDODONTIC INSTRUMENTS AMONG GENERAL DENTAL PRACTITIONERS: A QUESTIONNAIRE SURVEY

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ABSTRACT

Aim: A cross-sectional questionnaire survey was conducted to obtain information on the use of rotary nickel – titanium endodontic instruments was conducted among General Dental Practitioner A two sectioned questionnaire was mailed to 200 randomly general practitioners to obtain information on usage of Nickel – Titanium endodontic instrument and data was collected.

Results: Forty-six percent of the general practitioners had used rotary NiTi instruments. 76% dentists use NiTi files for five or more times a week. Most of the dentist used NiTi file coronally & apically. General dentists experienced more file fracture at size 20 and 25 with 0.02 and 0.04 taper.

Conclusions: Dentists are familiar with limitations of NiTi instruments and techniques. Current study showed the awareness of dentists about benefits of NiTi rotary instruments application comparing to traditional techniques and also the high percent usage of these instruments among general dentists.

KEYWORDS: questionnaire survey, general dental practitioner, nickel–titanium endodontic instruments

INTRODUCTION

NiTi alloy was discovered by Buehler et al and named Nitinol (Nickel, Titanium, Naval Ordnance Laboratory). The first dental application of NiTi suggested was as an orthodontic wire. The alloy was then suggested to be used in the manufacture of endodontic instruments and first use of NiTi in endodontic was reported by Walia et al. During the past 15 years, nickel-titanium (NiTi) rotary instruments have become a part of the standard armamentarium in

endodontics. They are used extensively by generalists and specialists to facilitate the cleaning and shaping of root canals, cleaning and shaping of the root canal system is one of the main goals in endodontics which can be carried out using different systems and techniques¹. To reach this aim, stainless steel hand instruments have been traditionally applied. The lack of flexibility of stainless steel endodontic instruments, especially in the larger sizes, meant that apical sizes necessarily remained small, risking

inadequate microbial control in the apical portion of the root canal^{2,3}. Whilst the biological importance of antibacterial root canal irrigants and intra-canal medicaments is beyond question, increasing apical preparation size may also be important in reducing numbers of micro-organisms^{2,4}. Larger apical canal sizes attainable with rotary NiTi instruments will allow greater access for the antibacterial irrigants to the apical regions of root canals² and result in fewer micro-organisms⁴. The ability of some

NiTi rotary systems in maintaining the root canal curvature has been studied⁵⁻¹⁰. Fracture susceptibility is considered as a major disadvantage of these instruments¹. To date, there are a few studies about the adoption of this particular technology. A study in Switzerland concluded that 80% dentists preferred Light speed rotary files for instrumentation. Seventy-six percent of these experienced file fracture¹¹. Different reasons have been reported for instrument separation such as excessive pressure, incorrect insertion angle and intra-canal complex anatomy. Recently, a questionnaire study in the USA showed that NiTi rotary instruments usage has correlation with region, graduation date and type of practice. More than 50% of respondents used NiTi rotary instruments for several patients before disposal; crown-down technique was the most frequent preparation method¹².

This study aimed to assess the extent of adoption, usage and issues associated with NiTi rotary instruments and techniques by general dental practitioners.

MATERIAL AND METHODS

A cross-sectional questionnaire survey was conducted to obtain information on the use of rotary nickel-titanium endodontic instrument was conducted among General Dental Practitioner. Ethical clearance was obtained from ethical committee of Mahatma Gandhi Dental College and Hospital. Study questionnaire was divided into 2 parts, the first part consists of Demographic details of dental practitioners regarding age, year of qualification, field of practice. The second part of questionnaire consists of 25 questions regarding the file brands; usage techniques, frequency of use, re-

use and occurrence of file fracture during canal preparation with NiTi rotary instruments. General practitioners both BDS and MDS from all specialties were included in the survey. Samples were randomly selected; out of which the questionnaires were mailed to 200 randomly selected General Dental Practitioner. Email address of the dental practitioners was obtained from IDA office, Rajasthan. Since the study was designed to explore the endodontic practice profile among General Dental Practitioner and dentists with limited practice in any discipline were excluded. The questionnaire was accompanied by a consent letter explaining the objectives of the survey and requesting participation. Confidentiality regarding survey results was also maintained. To increase the response rate a reminder mail was also sent to study participants. The data was collected during the period from May to October 2015. The data was entered in the Microsoft Excel 2007. Descriptive statistics was used.

RESULTS

Table 1 shows the period of time for which the general practitioners used rotary NiTi instruments. Forty-six percent of the general practitioners had used rotary NiTi instruments for over 36 months and only 9% have been using for less than one month.

Table 1. Period of time for which the general practitioners used rotary NiTi instruments.

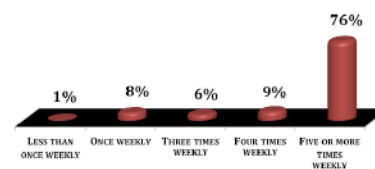
>3 years	2 years	1 year	<1 month
46%	29%	16%	9%

Among all dentists, 76% dentists use NiTi files for five or more times a week and only 1% use less than once a week. NiTi instruments were mostly used

for molar teeth (56%) and premolar teeth (28%) but a smaller number used them in anterior (16%).

Figure 1 represents how often they use rotary NiTi files for root canal cleaning and shaping.

Figure 1. How often they use rotary NiTi files for root canal cleaning and shaping.



General dentists mostly used protaper (77%), HERO shapers (8%) and K3 (5%) systems. However, protaper and HERO shapers were accordingly the most commonly reported instruments by dentists. Crown-down technique (57%) was the most common method followed by Modified crown-down technique (29%) (Figure 2).

Figure 2. Graphic representation of teeth in which NiTi file was used.

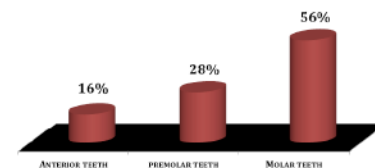
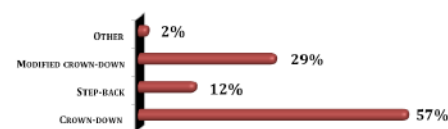


Figure 3. The technique which the general practitioners use while using NiTi.



Most of the dentist used NiTi file coronally and apically (60%) (Table 2).

Among all responders 65% of general dentists used 2-5 times. Also, 26% indicated 6-10 times and 2% mentioned single use of these instruments. NiTi rotary instruments disposal decision was identified as after number of times the

instruments reuse which mentioned in previous question.56% dentists dispose when file unwinds or distorts. Twenty-five percent after use in very curved canals (Figure 4 and 5).

A total of 84% dentists undertake endodontic retreatments and of these 18% always use NiTi rotary instruments while 55% sometimes use NiTi rotary instruments and 22% never use NiTi for

retreatment (Figure 6).

Procedural problems with NiTi rotary instruments and hand instruments by the respondents of our study are demonstrated in table 3.

Table 2. The file systems used by the general Dental practitioners.

Protaper	HERO shapers	Hy-flex	K3	Others
77%	8%	3%	5%	7%

Figure 4. The number of times general dental practioners use NiTi files before discarding them.

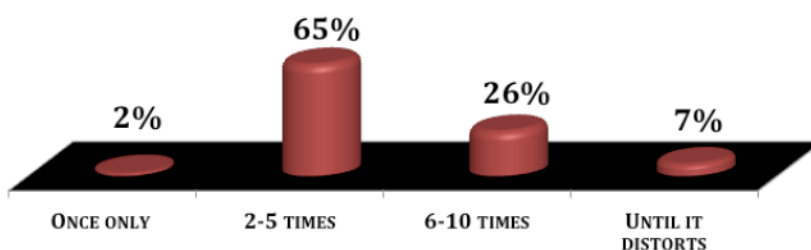


Figure 5. The criteria used by general practioners to decide when to dispose the NiTi file.

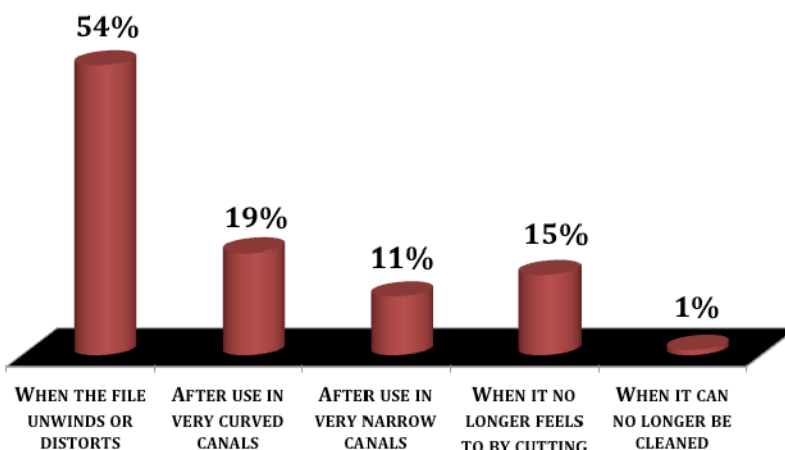


Figure 6. The percentage of dentists that use NiTi rotary instruments for the removal of gutta percha.

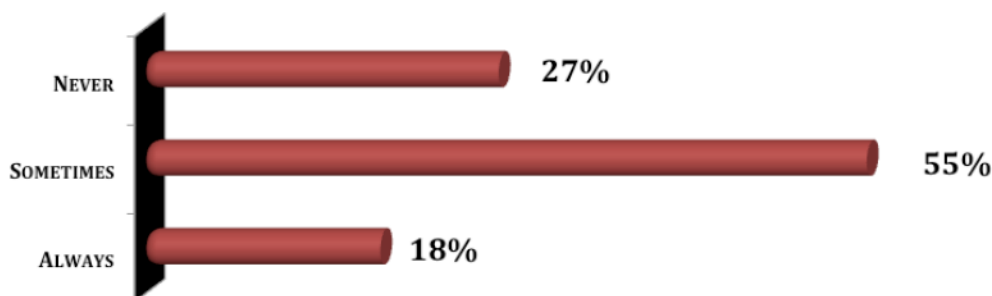


Table 3. The frequent procedural experiences with the use of NiTi rotary instruments.

Binding of file in the canal	Excessive dentine removal	Straightening of curved canals	Transportation of apical terminus of canal	Ledging of the canal	Strip perforation of curved canal
38 %	17%	12%	14%	10%	9%

Among the evaluated data, binding of the file in root canal is the most common. General dentists experienced more file fracture at size 20 and 25 with 0.02 and 0.04 taper. File fracture most commonly in the apical part (80%) following by middle part of canal (9%). This procedural error accident was rarely reported in the coronal part of root canal (1%).

In case of fracture, most of respondents reported retrieving the fractured file (62.5%). A considerable number of respondents (51.9%) obturated root canal only with reviewing the position of fractured file in the canal. Only a few referred such patient to an endodontist (19.2%) (Figure 7 and 8).

Figure 7. The taper of NiTi rotary instrument which fractures the most.

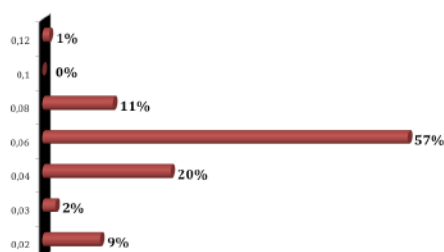
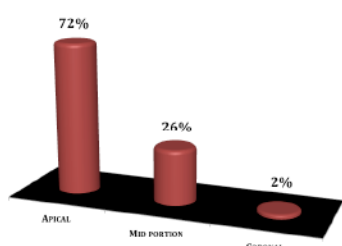


Figure 8. The portion of root canal in which the instrument fractures the most.



Overall, 69% of general dentists have attended NiTi rotary instruments complementary training courses. Thirty-

one percent of general dentists have not attended any course for the usage of NiTi rotary instruments.

DISCUSSION

The result of this study showed that 75% of respondent of general dentists used NiTi rotary instruments. Our findings were in consistent with some previous studies that showed 22% of general dentists and 64% endodontists in an Australian study¹, approximately 70% of general dentists and almost 83% of endodontists in a study performed in UK^{13,14} as well as 77% of the Swedish general dentists who participated in an endo dentists educational program¹⁵ have mentioned that they used NiTi rotary instruments.

In accordance with previous reports ^{1,12}, crown-down was the most common technique for canal preparation. However, it should be noted that dentists have employed sequence of NiTi rotary and hand instruments according to clinical conditions. Majority of dentists used NiTi instruments for 6-10 times; mostly based on serviceability of the instrument. Parashos and Messer have demonstrated that 70% of dentists used NiTi for 2-5 times; among which, 84% noted serviceability as the main criterion for application¹. In contrast, a study by Madarati et al.^{13,14} in UK showed that 44.8% of respondents discarded instruments after a single usage. This characteristic might indicate the responsibility in number of uses in UK practitioners.

General dentists experienced fracture of files at sizes 20 and 25. In a

previous report, Guelzow et al.¹⁵ showed the most file fracture at size 30. Di Fiore et al.¹⁶ reported the tip sizes of the instruments that fractured ranged from 20 to 40.

In a study by Barbakow and Lutz¹¹, safety (82%), dentists and patients' comfort (76%) and faster canal preparation (54%) and in a study by Bjourndal and Reit¹⁸ faster canal preparation, consequently decreased visit sessions and treatment length were the most reported advantages. Koch et al.¹⁵ reported greater root filling quality, less physically tiring technique for practitioners along with fast and easy procedures as advantages. Because of shorter treatment length, most patients are likely to refer to endodontist in comparison to general dentists¹⁶.

According to present study and some others^{1,17} it should be highlighted that training courses are necessary for using NiTi instruments. These courses should be more comprehensive and without bias by professionals familiar with a specific new technology.

CONCLUSIONS

Dentists are familiar with limitations of NiTi instruments and techniques. Current study showed the awareness of dentists about benefits of NiTi rotary instruments application comparing to traditional techniques and also the high percent usage of these instruments among general dentists.

Results of this questionnaire have demonstrated that dentists and dental students need more training and

more comprehensive education regarding new techniques and methods.

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