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RETROSPECTIVE ANALYSIS ON THE USE OF VARIOUS METHODS TO RETRIEVE THE GUTTA PERCHA FROM FAILED ROOT CANAL TREATMENT

George Franklin[1], S. Delphine Priscilla Antony[2*], J. Lakshmi Prabha[3]

[1]Undergraduate Student Conservative Dentistry and Endodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

[2*]Associate Professor Department of Conservative Dentistry and Endodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University 162, PH Road, Chennai 600077, TamilNadu, India.

Orcid ID - 0000-0001-9509-3665

[3]Tutor Conservative Dentistry and Endodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India

Email: [1]georgefranklin080@gmail.com, [3]delphy.priscilla@gmail.com

Corresponding Author: [2*]S. Delphine Priscilla Antony

[2*]Associate Professor Department of Conservative Dentistry and Endodontics Saveetha Dental College and Hospitals Saveetha Institute of Medical and Technical Sciences Saveetha University 162, PH Road, Chennai 600077, TamilNadu, India

Email: [2*]delphy.priscilla@gmail.com

Orcid ID - 0000-0001-9509-3665

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ABSTRACT:

Non-surgical endodontic treatment is commonly used in modern dentistry. The only treatment that can save your natural teeth is root canal therapy. This has provided the doctors with the option to restore severely damaged, nonfunctioning teeth to functional status. Although recent developments in surgical, prosthetic, and restorative care have made tooth replacement less time-consuming, it is universally agreed that a natural tooth is preferable to extraction and replacement. Failures of root canal treatments involve the removal of the obturating material Gutta-percha that was employed during the procedure. This study aimed to analyze three methods of retrieval of Gutta percha from failed root canal treatments according to tooth type and gender, and also check for further significant correlation between them.

Materials and Methods:

Patient data was collected from the records of a private dental hospital, Chennai from June 2019 to April 2023. The data was segregated according to the tooth number, type and location and total number of teeth retrieved using each method(H files, retreatment T files and both) and the gender of the patient and total number of teeth retrieved using each method. The data was further analyzed for any significant correlation between the tooth type , gender and method of retrieval of Gutta percha. Statistical analysis of the data was done using the SPSS software version. 24 and the results were plotted in a bar graph comparing the efficacy of the three methods.

Results:

The data showed that the maximum number of teeth successfully retrieved was using H files in maxillary anterior, and further there was no significant correlation between the gender and tooth type with the method of retrieval of Gutta percha.

Conclusion:

The current study came to the conclusion that H files are the best option for root canal procedures that don't work after assessing several Gutta percha retrieval techniques. It is the most successful method, consistently demonstrating its superiority as a dependable procedure for handling and treating such situations in endodontic therapy.

Keywords: Endodontic Root Canal Treatments- Gutta Percha Retrieval - H Files - Conventional Methods - Re Treatment T Files - Age Correlation - Tooth Type Correlation - Gender Correlation.

1. INTRODUCTION

The dental specialty known as endodontics is focused on understanding the causes, preventing harm to the dental pulp and periapical tissues, diagnosing these conditions, and treating them (1)(2). Microorganisms have been recognized as essential players in the etiology of periradicular illness for the past 40 years (3).The microbes present in the diseased root canal system were primarily obligate anaerobes, with a smaller amount of facultative anaerobes, according to ground-breaking research by Moller et al.1981, Fabricius et al. 1982 and Sundqvist et al . 1976 (4)(5)(6). The necrotic tooth pulp and its root canal wall both contain the diverse and interdependent bacteria, which together produce a sophisticated biofilm. The dentinal tubules may be penetrated. The host defense mechanisms fall short in certain areas. Intrusion of the periradicular tissue may happen if the latter is weakened or the microbes are highly pathogenic.Root canal therapy's goals are to rid the root canal system of as much bacteria as possible, seal it to stop re-infection, and promote healing. This needs to be accomplished without sacrificing the tooth's long-term functionality. The root canal can be shaped to facilitate cleaning more effectively and to create a proper form for the system's obturation (7). It has been shown in recent years that the microflora might potentially be more diversified. Uncultivable microorganisms have been found using molecular genetic techniques (8). Additionally, teeth that have undergone unsuccessful root canal procedures may have a flora that is different and more resilient than in de novo cases, making root canal retreatment tougher to succeed in (7,9). Around the world, root canal therapy is a fairly popular form of treatment. A minimum of one RFT is present in more than 50% of the population under study. The average RFT rate around the globe is higher than 8% (10). Every day, more than 41,000 root canal procedures are carried out, and an endodontist does roughly 25 RCTs per week. The efficacy of endodontic treatment varies between 86% to 98%, but failure rates, which can be as high as 20% of the treated cases, cannot be disregarded. These failure rates can be attributed to a variety of factors, including improper working technique adoption and the use of inappropriate materials (11). The most crucial phase in a successful root canal procedure is obturation of the root canal system. As near to the cementodentinal junction as is practical, the complete root canal system is filled in three dimensions. To guarantee a proper and acceptable seal, a small quantity of biologically suitable root canal sealers are employed alongside with the main filling material.Research is constantly being done to develop better endodontic obturating materials than those currently available to meet biological requirements and produce predictable long-term treatment outcomes. The root canal has been filled with a variety of substances. The outcomes ranged from favorable to occasionally devastating. Gutta is a combination of two Malay words: GETAH (gum) and PERTJA (tree name). It is essentially an extract of Palaquium, which is native to Southeast Asia. It is a poly isoprene trans-isomer. It has a number of commonalities to natural rubber due to its molecular structure (cis-isomer of poly iso-prene), but a variation in form causes it to act more like crystalline polymers. It is made up of Gutta, Alban, Fluanil, and traces of tannin, salts, and saccharine. Out of all the investigated materials, gutta-percha (GP) has proven to be the most durable, consistently performing well in clinical settings all around the world. No other substance can currently be thought of as a potential substitute for GP in its different forms. As a result, GP might be regarded as the ideal material for obturation (12). Furthermore, when compared to alternative obturation filler materials, this material is simple to extract if retreatment is required. There are different methods or procedures for retrieving gutta-percha, such as manual, rotary, laser, and so on. Each approach is chosen based on patient variables, the complex nature of the root canal anatomy, and, ultimately, the clinician's surgical skills and expertise(13 13). Gutta perchas can be retrieved using the following methods : Hand instruments, Rotary instruments, lasers, solvents, microdebriders and ultrasonic.

In the present study, a case study was employed on a population of patients according to the tooth type and location, the method of retrieval of GP and the total number of teeth retrieved using each method (H files and re-treatment T files) and gender . The aim of the study was to analyze if there is any significant correlation between specific tooth number and mode of retrieval and further analysis if there is any correlation between gender and the mode of retrieval, these results will help in further concluding which method of retrieval promoted best in the retrieval of gutta percha from failed root canal treatments.

2. MATERIALS AND METHODS

Retrieval of Gutta percha using H files:
Hedstrom files are hand instruments utilized to grip the cones and allow them to be readily drawn out. By putting the H-file along the outer edge of the loose gutta-percha, it is conceivable. The appropriate file size is chosen and transmitted along the gutta-percha side while avoiding contact with the canal walls.
H-files are spun a quarter-turn clockwise to ensure contact with the GP root canal filling, and when withdrawn from the canal, the file should pull free of the loose root filling [Ali SM et al 2015]. H-files are very successful because the file's configuration consists of a sequence of intersecting cones with higher cutting edges, allowing for more active involvement of the GP material.

Retrieval of Gutta Percha Using Retreatment T Files:
Retreatment Rotary files are intended to be used sequentially to remove filling materials such gutta-percha, carrier-based obturators, and paste fillers. The three easily identifiable files are designed to meet the various needs of unfilling prior to canal reshaping.

Sample Selection:
The data was collected from the case records of private dental hospital. The collected data was dated from June 2019 April 2023. Relevant data for the study was extracted from these patient records including demographic data (patient's age and gender), the tooth involved (tooth type and tooth location). Each data was tabulated using excel sheet with the total number of tooth retrieved using H files, Retreatment T files and both. Further using SPSS software ver. 24 the data were analyzed, statistically plotted and chi - square tests were done to check for any correlation between the tooth type and method of retrieval and the gender of the patient and method of retrieval of Gutta percha .

3. RESULTS

Tooth Number and Method of Retrieval of Gutta Percha:
The tooth type and location was tabulated along with the mode of retrieval and the total tooth retrieved using each method in excel sheet, the data showed that the most number of successful retrieval of GP was seen with H files in the maxillary anteriors(492) and minimum was seen in maxillary premolars using both the files for the process of retrieval (42).(Table 1). Further analysis was done using chi - square tests to verify if there is any significant correlation between the tooth number and method of retrieval of GP at $p < 0.05$ (Table 2), it was observed that there was no statistically significant correlation between the tooth number and method of retrieval of GP.

			Method Of Retrieval		
Tooth number		Both	H files	Re treatment T files	Total
	maxillary anteriors	174	492	354	1020

	maxillary premolars	42	106	56	204
	maxillary molars	71	157	112	340
	mandibular anteriors	38	111	66	215
	mandibular premolars	45	83	51	179
	mandibular molars	113	291	196	600
Total		483	1240	835	2558

Table 1. Table representing the Tooth number (type and location) and method of retrieval of Gutta percha employed (H files, retreatment T files and both) and the total number of teeth retrieved by each method.

	Value	df	Asymptomatic Significance (2-sided)
Pearson Chi-square	12.427a	10	.258
Likelihood Ratio	12.210	10	.271
Linear-by-Linear Association	2.004	1	.157
N of valid cases	2558		

Table 2. Chi - square test done to check for any correlation between the tooth number and method of retrieval of Gutta percha at $p< 0.05$.

Gender and Method of Retrieval of Gutta Percha:

The gender of the patients data collected was tabulated along with the method of retrieval of GP(Table 3) it was observed that the maximum number of tooth successfully retrieved was using H files in males (699) followed by H files in females (541) minimum retrieval was seen in females using both the files (205). Subsequent chi - square tests was done to check for any correlation between gender and method of retrieval of GP from failed root canal treatments at $p <0.05$ it was observed that there was no significant relation between gender and the method of retrieval of Gutta percha.(Table 4)

			Method of Retrieval		
		Both	H files	Retreatment T files	Total

Gender	Male	278	699	438	1415
	Female	205	541	397	1143
Total		483	1240	835	2558

Table 3. Table representing the gender of the patients and the method of retrieval of Gutta percha (H files, retreatment T files and using both) and the total number of teeth retrieve by each method

	Value	df	Asymptomatic Significance(2-sided)
Pearson Chi-squaree	4.305a	2	.116
Likelihood Ratio	4.299	2	.117
Linear -by- Linear Association	3.839	1	.050
N of Valid Cases	2558		

Table 4. Chi - square test done to check for any correlation between gender and the method of retrieval of Gutta percha from failed root canal treatments at $p < 0.05$.

The total number of teeth retrieved using each method; H files, retreatment T files and both according to the tooth types were statistically analyzed and plotted (Figure1). The data showed that the most successful number of teeth retrieved using the three methods of retrieval, was using H files and the maximum number of teeth retrieved was the maxillary anteriors.

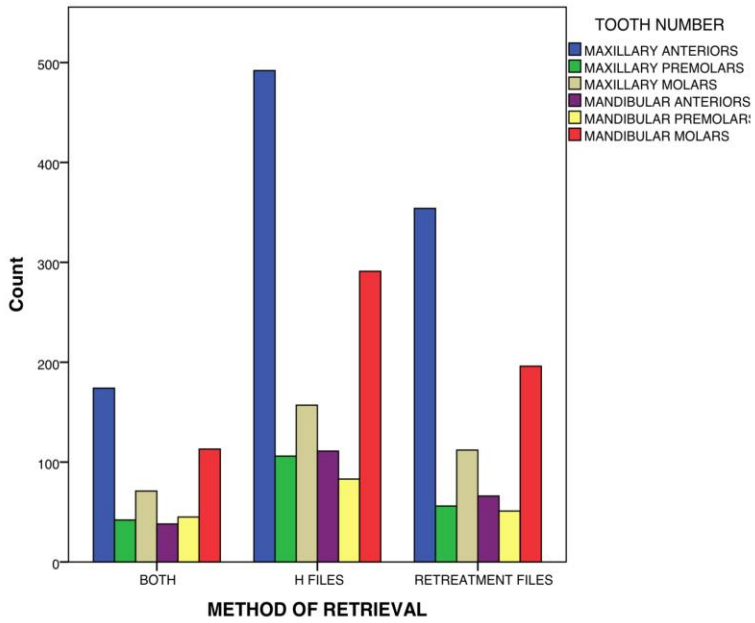

Figure 1. Bar graph representing the total number of teeth retrieved using each method according to the tooth type.

4. DISCUSSION

Endodontic retreatment is more difficult than the initial treatment of root canal infections. If not approached with caution, it may result in major iatrogenic consequences to the point where the teeth cannot be saved. The retrieval of Gutta-percha from the root canals is the most difficult aspect of endodontic retreatment (14)(15).Thus it becomes crucial to identify the most efficient method for the retrieval of Gutta percha from failed root canal treatments.Scientifically evaluating the retrieval rate is critical for assessing clinical risks and providing accurate information for clinical decision-making.Multiple factors influence the success rate of retrieving separated instruments, so clinical cases with a large sample size were collected to examine the relationship between these parameters and the retrieval rate (16).

In the study done by Neda et al 2022 (17), it was seen that hedstrom files were an effective method to retrieve Gutta percha from failed root canal treatments.

Another study conducted by Chen et al 2015 (18),The study found no significant link between the retrieval rate of upper and lower teeth, front teeth, premolars, and molars.According to certain investigations, the retrieval rate of detached instruments in molars was lower than in front teeth.

In another study conducted by Sahil et al 2020(19), upper anterior teeth had a greater incidence of root canal failure, which was similar to the findings of Dammaschke et al (20), who discovered that molars and premolars performed better than anterior teeth. Gender, jaw, tooth group, or number of root canals had no statistically significant relationship. These results were similar to the results of the present study.

In yet another study conducted by Smith et al 2019, is similar to the results of the present study, demonstrating a higher success rate with H files in removing gutta percha compared to T files. Similarly, a meta-analysis by Kasam S et al 2016 (21) found a significant preference for H files over T files in failed root canal treatments.

5. CONCLUSION

From the present study it can be concluded that H files are the standard for retrieval of Gutta percha in terms of their success rate and cost effective value.

Limitations of the Study:
The present study was conducted comparing only two methods of Gutta percha retrieval, more modern techniques can be compared over a larger population of patients to get a better result.

Conflicts of Interest :

The author reported the conflict of interest while performing this study to be nil

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Contribution of authors:

All authors contributed equally to the study

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