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Survey of the frequency of apicoectomy and retrograde obturation

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Abstract

Apical surgery is considered a standard oral surgical procedure. It is often a last resort to surgically maintain a tooth with a periapical lesion that cannot be managed with conventional endodontic (re-)treatment. The main goal of apical surgery is to prevent bacterial leakage from the root-canal system into the periradicular tissues by preparing a retrograde cavity and placing a tight root-end filling following root-end resection.

The aim of this study was to evaluate the necessity and frequency of apical resection, the materials used for retrograde filling and the monitoring of results by conducting a survey amongst Bulgarian dentists from Varna and Sofia.

The results are based on the answers of 120 dentists on an individual questionnaire for a period of 60 days. A very high percentage of respondents rely on apical resection as a dependable method for the retreatment of periapical lesions.

The research shows rising confidence in surgical treatment methods when periapical lesions cannot be treated with conventional endodontic methods only. Additionally 63% direct, on average, only one patient per month for apicoectomy, whereas 14% do not trust the surgical methods of treatment. 36% of dentists monitor patients after apical resection for more than one year. The method of cold lateral condensation is the most commonly used for root canal filling before apicoectomy.

Keywords: Apical resection, retrograde filling, endodontic lesions

Introduction

Endodontic surgery is an important part in the treatment of endodontic lesions. Sometimes it is the only option for some endodontic conditions. Apical resection ends with an exposed apical dentine surface that is why sometimes it is necessary to perform a retrograde cavity preparation for a retrograde filling. There are two different root-end cavity preparation techniques - conventional bur preparation and ultrasonic retrotip preparation (1).

Different materials can be used for retrograde obturation, including: amalgam, gutta-percha, zinc oxide-eugenol cements, glass ionomer cement, gold foil pellets, Cavit, composite resin, mineral trioxide aggregate (MTA) (2). The results from different studies mention that super-ethoxy benzoic acid and MTA are the most suitable materials and provide better results in apicoectomy procedures than other filling materials (3).

Materials and methods

A questionnaire about different methods for apical resection, the methods for endodontic treatment before apical surgery, the type of the ortograde and retrograde material and their opinion on the reliability of this type of treatment of endodontic lesions with periapical origin was developed in which different questions had to be answered. One hundred and twenty questionnaires were completed. Each questionnaire includes twelve questions with more than one possible answer. The duration of the conducted sociological study covers a period of 60 days.

Results

The answers from the survey showed that the majority of respondents (63%) direct on average only one patient per month for treatment by the method of apical resection (fig.1). Most of the dentists monitor the results of the root canal treatment and refer the patients only if there is no visible result of it. 14% do not trust surgical methods of treatment, which also speaks of a conservative approach as a method of choice for treating the root canal system. Ioannidou et al. (4) reported a study of 508 cases of odontogenic cysts of the jaws all treated by enucleation and apicoectomy of the teeth and received highly satisfactory results.

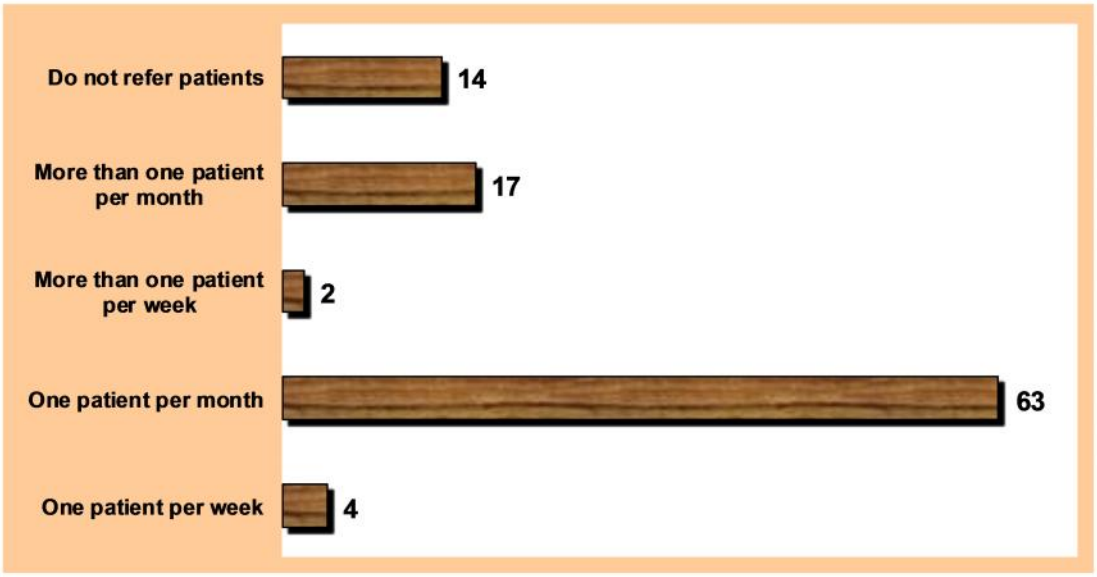

Fig. 1 Frequency of targeting patients for apical resection (%)

The highest percentage (55%) rely on the method of cold lateral condensation before apical resection. The disturbing fact is that the majority of doctors (28%) still obturate the root canal system before apical resection with zinc phosphate cement (fig.2). A high percentage (26%) of doctors apply the method of warm vertical condensation for root canal obturation, despite its high cost and additional training required, which is a good indicator for the future of dentistry in Bulgaria. In a study conducted in Toronto by Wand et al. (5) 155 teeth were treated by using flared preparation and vertical compaction of warm gutta-percha or step-back preparation and lateral compaction and then an apicoectomy was performed. The recall rate was 85% and the overall healed rate 74%. Healed rate was significantly higher for teeth with small (≤ 5 mm) rather than larger preoperative lesions.

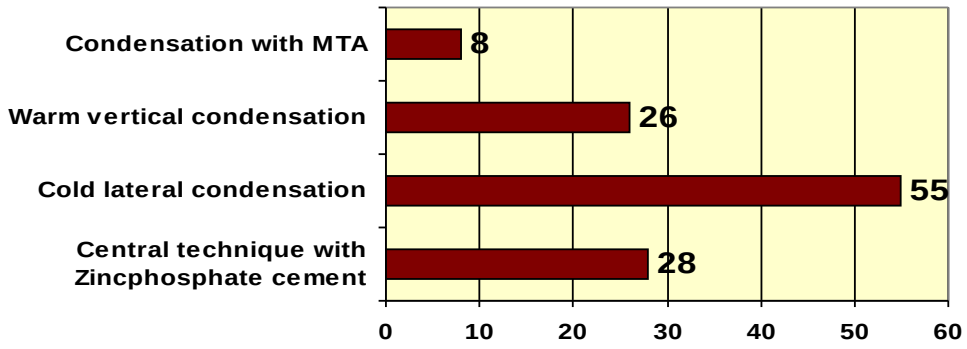

Fig.2 A method for root canal obturation

Low percentage of doctors make retrograde filling (43%). It is logical and can be explained by the fact that performing retrograde obturation needs special knowledge, equipment and skills. Also teamwork is required - from the surgeon and endodontist. This in turn will provide a perfect endodontic treatment and control of postoperative complications.

The most widely used material is MTA (57%), followed by GIC (30%) and amalgam (13%) (fig.3). Similar research, Bronkhorst et al., shows 35% use of amalgam especially due to its plasticity and convenience (6). Many of the studies for retrofilling material were carried out only in vitro. Of 324 papers initially identified, 108 papers reported in vitro studies, whereas in vivo studies were limited to only 32. This made it difficult to evaluate the clinical significance of new retrofilling materials in the clinical setting (7).

From the above results it is seen that amalgam is still widely used despite its demonstrated toxicity maybe because of its low price and good handling properties.

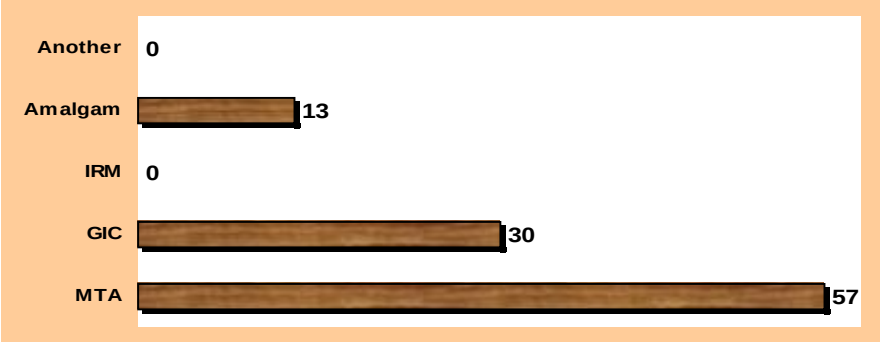

Fig. 3 Materials used for retrograde filling

The percentage of doctors who use machine files for root canal instrumentation before obturation (57%) is slightly higher than those who manually manipulate with hand files (43%) (fig. 4). This can be easily explained as the machine files work faster, easier and are not so expensive. In their study Ahlquist et al. (8) reported that the debris which was found in the apical region using the manual technique was less than this with machine files. No significant differences could be found at other levels. So no advantage of using the machine technique was found.

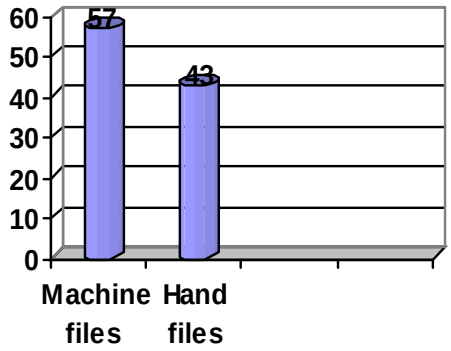

Fig. 4 Method of shaping the root canal system

Only 36% of dentists monitor patients after apical resection for more than one year, which is quite a rather small and worrying percentage in view of the importance and the major role of prevention in dentistry (fig.5). Taschieri et al. (9) evaluated a one-year follow-up of an apicoectomy of 46 teeth, while Gagliani et al. (10) monitor and compare the outcome of periradicular surgery in teeth that had previously undergone surgical treatment versus teeth that were undergoing a surgical procedure for the first time after a five-year follow-up.

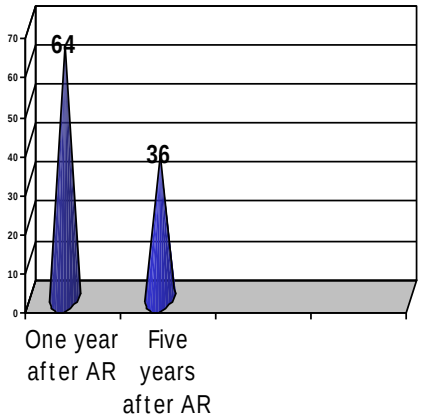

Fig. 5 Monitoring the results after AR

Discussion

The results show that 91% of the dentists trust apical resection as a method for the treatment of endodontic lesions, 57% use MTA for retrograde filling and 13% still use amalgam, despite its proven disadvantages. Most of the dentists (64%) monitor the results after apicoectomy for one year. Results from a survey conducted amongst Dutch surgeons showed that intermediate restoration material (IRM) is the retrograde filling material which is most widely used (47.6%) in cases of surgical apical endodontic treatment. Amalgam, with 35%, was second, especially due to its plasticity and convenience (6). Taking account of results from other clinical studies, the variation within the available research was too large. Even for the most investigated material, glass ionomer cement, it is hard to conclude whether it is superior or equivalent to amalgam. For the various other materials that have been introduced, clinical evidence is even more limited. Even MTA (mineral trioxide aggregate), widely accepted as a promising retrofilling material in the clinical setting in recent times, was supported only with case reports and in vitro studies.

A relatively high number of respondents do not apply modern methods for obturation of the root canal system before apical resection. There are still dentists who use zinc phosphate cement for root canal filling although it's with high cytotoxity (11, 12). It is noteworthy that the application of this material is characteristic of dentists with over 30 years of experience. This is easily explained by the updating of the curriculum and the teaching of new techniques and materials in universities. Despite the proven disadvantages of dental amalgam as a material for retrograde filling (13,14), still a large percentage of dentists use it for retrograde obturation. Commendable is the fact that almost half of the respondents use MTA for retrograde filling. MTA is believed to be a bioactive material with several favorable properties, such as stimulating cementum and hard tissue formation, and having an antibacterial effect due to its alkaline pH (10.2-12.5) (1, 3, 15). Newly introduced materials (Biodentine, Bioaggregate, iRoot BP Plus) have also shown comparable biocompatibility with a potential to provide favorable environment for the cell, showing cell proliferation and osteogenic capability but further research and clinical trials are required (16, 17, 18, 19, 20).

Conclusion

Our research shows rising confidence in surgical treatment methods when periapical lesions cannot be treated with conventional endodontic methods only. It is very important to continue working towards improving the awareness of doctors of the materials used for retrograde filling and promote new biocompatible materials (such as Biodentine, Bioaggregate, iRoot BP Plus). To avoid complications we must say that the whole process is important – from the root canal treatment and filling to the period following the apical surgery.

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