**Critically Appraised Topic (CAT)**

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| **Project Team:** |
| **6 A-1** |
| **Project Team Participants:** |
| **D4 – Evan Kopecky, D3 – Gabriella Pung, D2 – Joseph Lechelt, D1 - Safia Vohra** |
| **Clinical Question:** |
| **Is the PARL endo related and able to be treated with RCT?** |
| **PICO Format:** |
| **P:** |
| **Patients with periapical radiolucencies** |
| **I:** |
| **Root canal thearpy** |
| **C:** |
| **Alternative therapy** |
| **O:** |
| **Ridding tooth of infection** |
| **PICO Formatted Question:** |
| **In patients with PARLs which of the differential diagnosis are able to be resolved by RCT and which may need other forms of treatment?** |
| **Clinical Bottom Line:** |
| **Treatment of this patient’s periapical radiolucency via root canal therapy will rid the tooth of infection.** |
| **Date(s) of Search:** |
| **09/22/2020**  **09/28/2020** |
| **Database(s) Used:** |
| **PubMed and NCBI** |
| **Search Strategy/Keywords:** |
| **Periapical Radiolucencies, non-surgical, surgical, treatment, central giant cell granuloma** |
| **MESH terms used:** |
| **Periapical radiolucency**  **Non-surgical**  **Surgical**  **Treatment**  **Central giant cell granuloma** |
| **Article(s) Cited:** |
| Calişkan MK. Prognosis of large cyst-like periapical lesions following nonsurgical root canal treatment: a clinical review. Int Endod J. 2004 Jun;37(6):408-16. doi: 10.1111/j.1365-2591.2004.00809.x. PMID: 15186249.  W.H. Schreuder, H. van den Berg, A.M. Westermann, et al.**Pharmacological and surgical therapy for the central giant cell granuloma: A long-term retrospective cohort study**  J Craniomaxillofac Surg, 45 (2017), p. 232 |
| **Study Design(s):** |
| **Article 1: Clinical Review**  **Article 2: Retrospective Cohort Study** |
| **Reason for Article Selection:** |
| **Directly answers the PICO question** |
| **Article(s) Synopsis:** |
| **Article 1:**  Most periapical lesions are classified as a granuloma, cyst or abscess. Based on radiographic evidence alone, cysts and granulomas cannot be differentiated. Cysts either contain cavities completely enclosed by epithelial lining (true cysts) or contain epithelial lined cavities open to the root canals (periapical pocket cyst). There is a debate as to whether true cysts need to be treated surgically or are able to be treated via nonsurgical root canal therapy (RCT). Since about 40% of periapical lesions are cysts and 85% of periapical lesions successfully respond to RCT, it is reasonable to assume many of the cysts are responding to RCT. The purpose of this study was to evaluate the long-term clinical outcome of nonsurgical root canal treatment using calcium hydroxide in teeth with large cyst-like periapical lesions.  Between 1991 and 2001, 70 teeth with large periapical lesions in 50 patients were referred to the Department of Endodontics, Ege University. Of the 50 adults, 32 (17 males and 15 females) were selected, resulting in 42 anterior teeth. Those selected were found to have cholesterol crystals in their fluid samples. The teeth had no previous endodontic therapy. The periapical radiographs depicted large radiolucent lesions with well-defined margins around the apices of the teeth. Twenty-six of the teeth had signs and symptoms while the remaining were asymptomatic. All teeth were treated by one operator. Drainage was completed in all teeth, taking from 4 days to one month. Antibiotics were prescribed only in cases of extraoral swelling. After drainage the canals were instrumented via the step-back technique using K-type files and irrigated with 5.25% sodium hypochlorite. Calcium hydroxide paste was placed in the canal with a spiral filler, condensed with cotton pellets and sealed. The paste was changed two times at 3-week intervals and left for 3 months. After the 3-month period the dressing was removed via 5.25% NaOCl and the canals were obturated with gutta-percha. Teeth were then restored. Patients were seen at 3-month intervals during the first year, then at 6 or 12-month intervals in the hopes of a 2-10-year follow-up period. At the follow-up appointments radiographs were taken, analyzed and determined to have complete healing (tooth was symptomless, and the preexisting radiolucency resolved), incomplete healing (decrease in size or presenting scar tissue) or failure (expansion or no change in periapical lesion).  Trauma (22 teeth) was considered the most common factor in periapical lesions followed by caries or defective restorations. 71.4% of teeth were maxillary anterior teeth. Pain in 20 of the 26 symptomatic teeth was eliminated in 1-3 days, while the extraoral swelling resolved in 6-12 days. Complete healing was found in 73.8% of teeth, incomplete healing in 9.5% of teeth and failure was observed in 16.7% of teeth. 7-10 mm lesions healed in 87.5% of cases (complete healing in 79.2% and incomplete healing in 8.3%) Lesions with a diameter of 11-18 mm healed in 77.8% of cases (complete healing in 66.7% and incomplete healing in 11.1%). A chi-square test was run to evaluate the correlation between initial size of the lesions and the outcome of treatment, and no positive relationship was found. Root canal failure occurred in seven teeth and was thought to be due to overfilling, advanced periodontal disease and further trauma.  Treatment options for large periapical cysts include nonsurgical root canal therapy, apical surgery or extraction. When nonsurgical treatment is difficult or ineffective surgery may be indicated. Another technique to possibly use is the decompression technique, which has been found to have success. Overall there are favorable results in treating a large cyst-like periapical lesion via nonsurgical root canal therapy using calcium hydroxide.  **Article 2:**  The purpose of this study was to assess and compare different surgical and non-surgical approaches for patients with a central giant cell granuloma (CGCG). CGCG vary from small asymptomatic, slow growing lesions to large, aggressive lesions which can be destructive and may recur.  From 1994 to 2013 patients with a histologically confirmed CGCG were referred to the department of Oral and Maxillofacial Surgery at the Academic Medical Center Amsterdam. Patients with an underlying syndrome or systemic diseases linked to giant cell lesions were excluded as well as patients with incomplete medical documentation. Lesions were classified as aggressive or non-aggressive based on size, localization, growth rate, symptoms, cortical bone perforation/thinning and recurrence. Patients were placed into one of three groups: group 1 (surgery), group 2 (pharmacotherapy) and group 3 (pharmacotherapy and surgery). The outcome of treatment was assessed using computed tomography and categorized as one of the following: complete remodeling, complete ossification, non-progressive residual lesion or progressive residual lesion. Side effects were also recorded for non-surgical interventions as well as the postoperative morbidity for surgical procedures.  A total of 66 patients were identified and based on the eligibility criteria only 33 patients were included in the study. The study contained 51.5% males and 48.5% females with a mean age of 21.4 years at the time of diagnosis. 54.5% of the lesions were located in the mandible whereas 45.5% were located in the maxilla. 72.7% of the lesions were classified as aggressive and 27.3% as non-aggressive. Of the 33 lesions 7 were recurrent after previous surgical enucleation. Of the total of 4 patients in group 1 only one showed progression of the lesion after 6 months while the remaining showed complete remodeling. The mean follow-up was 4.7 years. Complications included skeletonization of the inferior alveolar nerve (IAN) in 3 cases, hypoesthesia of the IAN in 2 and anesthesia of the IAN in one patient. One patient lost their mandibular first molar as well as needing endodontic treatment to neighboring teeth. The remaining patients (29 patients) started in group 2, 14 of which did not need additional surgery. The mean duration of treatment for these patients was 25 months. Patients were initially treated with calcitonin nasal spray, those that did not have regression were then switched to interferon or the combination of interferon and calcitonin subcutaneous injections. The long-term response for 64.3% of the lesions was either complete remodeling or ossification and 28.6% had non-progressive residual lesions. The non-progressive residual lesions were considered to be inactive due to the small size or partial regression after pharmacotherapy, therefore they were chosen for close follow-up rather than surgical intervention. Only one lesion progressed after 1.1 years of follow-up. The remaining 15 patients from group 2 were moved to group 3 to undergo subsequent enucleation due to one of the following: large residual radiolucency despite pharmacotherapy, lack of further spontaneous regression after cessation of pharmacotherapy, intolerance to medication, correction of bony expansion, or existence of bone cavity due to embolization of facial arteries. The long-term response for those who underwent conservative enucleation after pharmacotherapy ranged from complete remodeling (80%) to non-progressive residual lesion (20%). Only 27% of patients experienced grade 2 or moderate side effects of pharmacological treatment while 90% experienced grade 1 or mild side effects.  Overall it was found that pharmacological treatment is valuable in reducing the need for surgery as well as decreasing the long-term recurrence rates. This treatment can be helpful in young individuals whose tooth buds and neurovascular bundles might be at risk from the surgical intervention. Moreover, the patients in group 3 that had additional surgery benefited from the pharmacotherapy because it allowed for a more conservative approach. The major limitations of this article include the large time frame, small sample size and low level of evidence. |
| **Levels of Evidence:** (For Therapy/Prevention, Etiology/Harm)  See <http://www.cebm.net/index.aspx?o=1025>  **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)  **1b** – Individual RCT  **2a** – Systematic Review of Cohort Studies  **2b** – Individual Cohort Study  **3** – Cross-sectional Studies, Ecologic Studies, “Outcomes” Research  **4a** – Systematic Review of Case Control Studies  **4b** – Individual Case Control Study  **5** – Case Series, Case Reports  **6** – Expert Opinion without explicit critical appraisal, Narrative Review  **7** – Animal Research  **8** – In Vitro Research |
| **Strength of Recommendation Taxonomy (SORT) For Guidelines and Systematic Reviews**  See article **J Evid Base Dent Pract 2007;147-150**  **A** – Consistent, good quality patient oriented evidence  **B** – Inconsistent or limited quality patient oriented evidence  **C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening |
| **Conclusion(s):** |
| **The literature shows that RCT has a high success rate for cysts, granulomas and abscesses. Based on patient’s radiographs, pulp testing and symptoms the lesion is of endodontic origin and root canal therapy is the recommended treatment of choice.** |