**Critically Appraised Topic (CAT)**

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| **Project Team:** |
| **Group 4A-2** |
| **Project Team Participants:** |
| **Sam Miller, Austin Tweet, Anum Siddiqui, Miranda Saitoski** |
| **Clinical Question:** |
| **What is the best option for restoring teeth with compromised tooth structure?** |
| **PICO Format:** |
| **P:** |
| **Compromised remaining tooth structure** |
| **I:** |
| **Extraction and implant placement** |
| **C:** |
| **Root canal therapy, post and core, crown** |
| **O:** |
| **Higher survival rate** |
| **PICO Formatted Question:** |
| For patients with compromised remaining tooth structure, will a single tooth implant compared to root canal, post, core and crown lead to a higher survival rate? |
| **Clinical Bottom Line:** |
| **Both implant-supported restorations and root canal, post, core and crown offer favorable and good long term survival rates. Deciding between which therapy to pursue will depend on the individual patient’s situation. If the patient has adequate ferrule and would like a quicker, less invasive solution, recommend the root canal therapy with post, core and crown.** |
| **Date(s) of Search:** |
| **10/5, 10/21** |
| **Database(s) Used:** |
| **Pubmed from National Institute of Health, Wiley Online Library, Science Direct** |
| **Search Strategy/Keywords:** |
| **Dental implants, root canal therapy, post and core technique, core build up, survival rate, dental crown** |
| **MESH terms used:** |
| **Dental implants, survival rate, root canal therapy, post and core technique, dental crown** |
| **Article(s) Cited:** |
| **Torbinejad et al (2007) Outcomes of root canal treatment and restoration, implant-supported single crowns, fixed partial dentures, and extraction without replacement: a systematic review. Journal of Prosthetic Dentistry, 98(4), 286-311**  **Jung et al (2012) Systematic review of the survival rate and incidence of biologica, technical and aesthetic complications of single crowns on implants reported in longitudinal studies with a mean follow up of 5 years. Clinical Oral Implants Research**  **Sarkis-Onofre et al (2014) Cast metal vs. glass fibre posts: a randomized controlled trial with up to 3 years of follow up. Journal of Dentistry 42 (5), 582-587** |
| **Study Design(s):** |
| **Systematic review**  **randomized controlled trial** |
| **Reason for Article Selection:** |
| **Article 1: This was selected because it directly compares the clinical survival rates of fixed partial dentures and more importantly placement of implant and root canal treatment. It also did a good job of measuring survival rates at longer intervals such as at the 10 year mark.**  **Article 2: I selected this article because it analyzed the survival rates of implant placement and the restoration with a single crown. This article also took a look at the different biological, technical and aesthetic complications that play a role in implants success. The type of restoration used to restore the implant was also considered.**  **Article 3: I selected this article because I wanted to find one the talked about the survival rate of endodontic therapy when there is a lack of coronal tooth structure. While this article directly compared the different types of post material on the market, it painted a picture of how effective endodontic therapy is even if there is no coronal wall of tooth structure as all of the crowns were PFMs.** |
| **Article(s) Synopsis:** |
| **Article 1: This systematic review was aimed at answering 3 clinical questions that compared endodontic treatment to extraction and placement of implant, fixed partial denture, or extraction without tooth placement. Both implant and root canal treatment had superior survival rates with success rates being consistently higher for implants. Although defining success for these procedures remains an ever evolving and subjective process. Implant success is most frequently described using Albrektsson et al and measures periimplant annual marginal bone loss, mobility, absence of periimplant radiolucency, absence of signs and symptoms, low rates of vertical bone loss, and high 5- and 10-year success rates. This is subject to change however and may include restorative and patient-based parameters as well. Long term 6+-year weighted survival data indicated that both root canal therapy and extraction and replacement of tooth with an implant were superior in survival (97%) compared to a FPD (82%). Success data over 6 years ranked implant therapy (95%) superior to endodontic treatment (84%) but different definitions of success limit the value of this observation. Also of all the articles reviewed, only one directly compared RCT and implant therapy so more research is needed. In this article it mentioned that implants were evaluated at the restoration phase only and not after placement. Also the level of expertise of the operator varied as implants were placed by specialists or specialty residents while the endodontic therapy was done by dental students, residents or staff. Overall, using endodontic therapy or implant therapy has a higher survival rate compared to the fixed partial denture therapy and choosing between the former two should be based on the presenting patient’s circumstances.**  **Article 2: This systematic review looked at the survival rate and incidence of biological, technical, and aesthetic complications of single crowns on implants. The review of studies yielded data from a total of 3,199 single crowns which all varied in restorative material and crown retention method. Survival of the implant was defined as remaining in situ with or without modification during the 5-year observation period. The calculated implant survival based on the 46 included studies was 97.2% after 5 years and 95.2% after 10 years. The survival of single crowns on the implants was 96.3% after 5 years and 89.4% after 10 years of loading. Its important to note that the older studies included in this review were primarily responsible for higher failure rates as the technology for implant placement and implant systems have advanced significantly. Biological complications are not standardized and these vary widely from inflammation, mucositis, bleeding and suppuration. Cumulatively, the soft tissue complication rate was 7.1% after 5 years. Aesthetic complications are measured by looking at papilla height and patient questionnnaires. Examples of these complications include dehiscences of the soft tissue with crown margin exposure and suboptimal color of the prosthesis. The aesthetic complication rate was 7.1%. Technical complications revealed that abutment or screw-loosening (8.8%) were the main issues. When comparing all-ceramic to PMF crowns, the survival rate, fracture rate of ceramic and incidence of framework fractures were investigated. The survival rate was similar for both materiels while the incidence of framework fracture had no significant difference as well. Studies on ceramic abutments is limited and should be investigated further. Overall this meta-analysis concluded that implants and their single crowns report high survival rates.**  **Article 3: This randomized controlled trial compared the survival of glass fiber and cast metal posts to restore endontically treated teeth with no remaining coronal wall. They evaluated 72 teeth and followed up after 3 years. All teeth were endodontically treated the same using the same procedures and the different posts were placed and subsequently resotred with PFM crowns. Overall, the survival rates of teeth restored with glass fiber posts compared to cast metal posts performed similarly when the amount of remaining coronal tooth structure was questionable. The glass fiber posts had a survival rate of 97.1% and cast metal posts were at 91.9% so both material types boast great survival rates for patients that have no coronal wall tooth structure remaining. The drawback to this RCT is that the follow up was only 3 years so more research is needed.** |
| **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):** |
| **Judging from the evidence that I found, our patient would benefit from either a fixed implant single crown or a root canal with subsequent post placement, core build up and crown. I think it would be wise to present both options to the patient and present the positives and negatives of each.** |