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| **Name:** |
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| **Pathology Question:** |
| How does post placement affect fracture resistance? |
| **Report:** |
| A vital, healthy, complete tooth is strongest and resists fracture much better than a tooth that would be indicated for endodontic treatment. From initial damage or long term degeneration to the preparation and restoration, there are many factors that weaken a tooth indicated for endodontic therapy. Non-vital teeth require endodontic treatment in order to maintain and preserve remaining tooth structure and viability. At this point, the tooth has lost mechanical responsiveness and prioprioceptive sensitivity. This lack of sensation leads to less discomfort and indications of pain or pressure which are beneficial in warning of increasing occlusal load that could harm the tooth if not stopped. Also, when a tooth loses vitality, it undergoes many changes to the structure that lead to susceptibility to fracture. First, the collagen binding is incomplete and there is a weakening of the collagen fibers due to dentinal dehydration. Dentin needs to be hydrated and collagen bound to prevent from collapse. Hard dentin structure is also lost from caries, prior cavity preparations, endodontic therapy, or other lesions that have affected the tooth over time. In access preparations during endodontic treatment, the roof of the pulp chamber as well as surrounding structure are removed, chemicals are added to the preparation, and canals are enlarged, all leading to reduced strength and increased flaws in the micromechanical structure (Dimitriu et al., 2009).  The optimal post would retain the core without creating excess or undue stress on the surrounding, remaining tooth structure. This is not always achieved, and problems can occur from stresses on the tooth in the crown or the root (Alharbi eta l., 2014). When preparing the tooth for the placement of a post, loss of dentinal structure may lead to the formation of microfissures and microcracks which can confer fracture propagation. While the post may promote retention of the restoration and distribute occlusal stresses, there are times when this is not achieved. Since the crown and core are connected to the post, the stresses and forces placed coronally must be considered. The crown transfers compressive and shear stress away from the crown and down to the roots which could increase fracture propagation (Fei etal., 2018). Further, anchoring a core and crown inside the canal does not strengthen the remaining dentin, and a rigid post will only increase stress. Crown movement will result in more stress on the root, which already has decreased remaining structure. Some of this stress could be reduced by increasing the number of walls or incorporating a ferrule into the preparation form. Overall, preparation form and remaining tooth structure, specifically dentin, is central in determining the longevity of the tooth (Marchionatti et al., 2017). There are many aspects of the post, core, and crown that can contribute to greater or decreased success of the endodontic treatment. The factors mentioned may work synergistically to decrease the survival rate of endodontically restored teeth, with fracture being a common source of failure. |
| **References:** |
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