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| **Name:** |
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| **Group:** |
| 6A-5 |
| **Pathology Question:** |
| What are the four reasons for root canal therapy failure? |
| **Report:** |
| The goal of root canal therapy (RCT) is to create healthy conditions that prevent the development of apical periodontitis or create an environment condusive to the healing of periradicular tissue (cementum, alveolar process, PDL), allowing the paitient to retain the tooth in the oral cavity. A major indicator that RCT has failed is the development or persistence of apical periodontitis, which is an inflammatory disease, typically caused by a microbial infection of the root canal system.Although there are a variety of potential causes, four reasons for root canal therapy failure our group would like to discuss include the following:1. Inadequate Cleaning of the Canals
2. Poor Apical Sealing
3. Granulation Tissue at the apex
4. Root Fracture

Inadequate cleaning of the root canal system of its primary or secondary infection can result in persistent infections. Some of the remnant microbes (or microbes iatrogenically introduced due to lack of rubber dam usage or poor aseptic technique) are capable of resisting intracanal antimicrobial procedures, ultimately surviving within the prepared canal. These survivers may eventually access periradicular tissues and induce apical periodontititis.Poor apical sealing often occurs in overfilled root canals. This occurs when excess filling material pushes through the root’s apical foramen, leading to leakage or loss of material, which provides an entry point for surrounding tissue fluids to seep into the root canal system. The surrounding fluids potentially contain nutrient supply for any remnant bacteria to feed and thrive on, eventually leading to periradicular lesions at the apex. Extraradicualr infection can also enter the root canal system through this inadequately sealed foramen to induce infection that can lead to apical periodontitis.Granulation tissue at the apex can also be a cause of RCT failure. Granulomas are cellular barriers created as an immune defense, which act to contain pathogenic microbes such as those in extraradicular lesions to prevent their spread, or other foreign bodies, such as extruded filling material, which will induced a foreign body response. Although most microbes can’t penetrate the barrier, their byproducts can diffuse across it, inducing pathosis and potentially progressing to apical periodontitis.Finally, root fracture can also lead to a secondary infection and apical periodontitis. One way root fractures may occur is due to overinstrumentation when enlarging the canal size during treatment, leading to a weakening of the root structure. Depending on the severity of the resulting crack, the root canal system could be exposed to the oral cavity microbiota, carious lesions, or extraradicular infections, resulting to reinfection of the root canal system and eventual progression to apical periodontitis. |
| **References:** |
| Siqueira JF Jr. Aetiology of root canal treatment failure: why well-treated teeth can fail.Int Endod J. 2001 Jan;34(1):1-10. doi: 10.1046/j.1365-2591.2001.00396.x. PMID: 11307374.Siqueira JF Jr, Rôças IN, Ricucci D, Hülsmann M. Causes and management of post-treatment apical periodontitis. Br Dent J. 2014 Mar;216(6):305-12. doi: 10.1038/sj.bdj.2014.200. PMID: 24651336. |