

UNIVERSITI TEKNOLOGI MARA

**EFFICACY OF TWO
ROTARY FILE SYSTEMS IN GUTTA
PERCHA REMOVAL
FROM EXTRACTED MAXILLARY
MOLARS FOR RETREATMENT: A
THREE-DIMENSIONAL
VOLUMETRIC ANALYSIS USING
CONE BEAM COMPUTED
TOMOGRAPHY**

MOHD NAZRIN BIN MOHD ISA

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ABSTRACT

Ideally, an instrument for endodontic retreatment should allow for complete gutta-percha (GP) removal in a short period of time as well as no instrument separation to occur. The contaminated residues of gutta-percha and sealer appear to restrict the passage of the irrigants to the dentinal tubules, particularly in cases of non surgical root canal retreatment (NS-RCRT) with anatomical variances. Therefore, any interference between the dentin and the irrigants should be minimized to ensure maximum irrigation efficiency. This study aims to investigate the efficacy of XP-endo Shaper, Edgefile XR, and Hedstrom files in NS-RCRT evaluated using Cone Beam Computed Tomography (CBCT). A total of 45 extracted teeth of maxillary molars were instrumented and obturated. Preoperative CBCT scans were obtained, and the teeth were retreated using Edgefile XR, XP Shaper, and Hedstrom files (n=15 teeth per group). After retreatment, the teeth were rescanned, and three-dimensional images were constructed to assess the percentage volume of remaining root canal filling material. The total time for retreatment was recorded, and the data were analyzed statistically. As a result, the XP Shaper demonstrated significantly greater percentage removal of gutta-percha compared to the EdgeFile XR group. The distobuccal (DB) canal exhibited the lowest percentage of remaining material in comparison to the mesiobuccal (MB) canal, while no significant difference was observed when compared to the palatal (P) canal. Among the instruments tested, the Hedström file required the longest duration to complete retreatment. In conclusion, root canal filling was efficiently removed using the XP Shaper compared to Edgefile XR instruments however there was no significant difference compare to hand files. The XP Shaper and Edgefile XR are shown to be advantageous over hand files in terms of operating time.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

This chapter provides an overview and framework of the study conducted. The discussion aims to describe the importance and techniques for gutta-percha removal in endodontic retreatment. This chapter will also briefly discuss the method for determining the volume of gutta-percha in the root canal system.

1.2 Research Background

Non surgical root canal treatment (NS-RCRT) aims to treat and prevent periapical tissue irritation caused by infections within the root canal system, utilizing a combination of chemomechanical debridement and thorough sealing of the root canal (Basrani & Malkhassian, 2015; Bergenholtz et al., 1979). Despite a reported success rate of 86% to 96% for root canal treatments, complications persist, with studies showing that 60% to 72.1% of cases of apical periodontitis develop in treated teeth (Chala et al., 2011; El Ouarti et al., 2021; Georgopoulou, 2005). These failures are attributed to a variety of biological factors, notably intraradicular and extraradicular infections, foreign body reactions, and true cystic lesions (Nair, 2006; Siqueira et al., 2014). The primary cause of persistent apical periodontitis is often residual intracanal infection, which arises from inadequate eradication of microorganisms during initial treatment or reinfection post-treatment (Allen et al., 1989; Kim et al., 2018; Sjögren et al., 1997).

Technical challenges also significantly contribute to treatment failures. Non-aseptic techniques, the use of unsuitable irrigants, the inability to adequately prepare the root canal length, procedural errors, suboptimal obturation, and bacterial resistance have all been documented as factors affecting treatment outcomes (Allen et al., 1989; Basrani & Malkhassian, 2015b; Costa et al., 2019; Lin et al., 2014). Whenever possible, non-surgical retreatment is chosen for managing endodontic failures due to its conservative nature (Martins et al., 2023).