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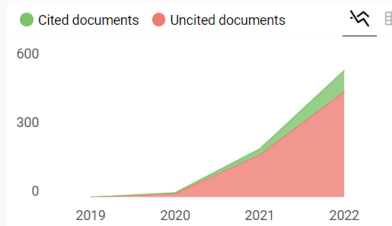
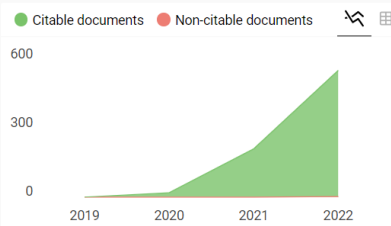
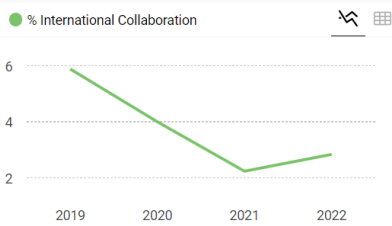
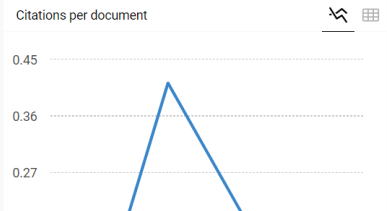
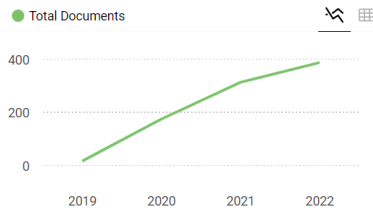
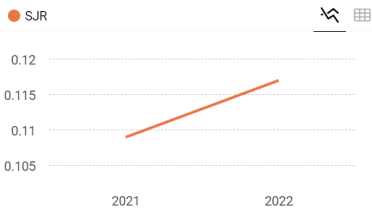
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TABLE OF CONTENTS

Editorial Board Bali Medical Journal	ii
Table of Contents	v
1. Effect of black tea (<i>Camellia sinensis</i>) toward tooth enamel hardness after being soaked in carbonated drinks	1
Deli Mona, Salsabilla Ariesa, Didin Kustantiningtyastuti	
2. The effectiveness of 40% hydrogen peroxide for tooth bleaching after fixed orthodontic treatment: a case report	4
Saidah Amir, Noor Hikmah	
3. Endodontic broken file retrieval in curvature premolar tooth: A case report	4
Muhammad Rizky, Wandania Farahany, Nevi Yanti	
4. Observation of unintentional extrusion of mineral trioxide aggregate in opex apex traumatic dental	9
Jessica Komala, Nevi Yanti, Widi Prasetya	
5. Endodontic re-treatment of taurodontic mandibular right molar: a case report	11
Febriana Nancy Silaban, Trimurni Abidin, Widi Prasetya	
6. Endodontic treatment on mandibular molar with radix entomolaris: a case report	13
Wiriananta Putra, Trimurni Abidin, Cut Nurliza	
7. Multidisciplinary treatment approach for perforated internal root resorption in a maxillary central incisor: A case report	15
Suryana Tamba, Widi Prasetya, Cut Nurliza	
8. Single-visit endodontic treatment of left mandibular second molar with constricted canals followed by indirect resin composite overlay: A case report	18
Tika Ikke Ivanti, Wandania Farahanny, Trimurni Abidin	
9. Root canal treatment on right mandibular molar with calcified canal: A case report	21
Edi Satria, Nevi Yanti, Widi Prasetya	
10. Non surgical root canal treatment of traumatized tooth with external inflammatory apical root resorption: A case report	24
Frida Maya Rustiqa, Trimurni Abidin, Widi Prasetya	
11. Management of anterior tooth fracture with endodontic treatment and anatomical post with direct restoration: A case report	27
Sasha Allayya Tiffany, Wandania Farahanny, Cut Nurliza	
12. Endodontic treatment of mandibular third molar with deep margin elevation in patient with gag reflex: A case report	29
Hana Nuradinda Tarigan, Trimurni Abidin	
13. Endodontic treatment of maxillary second premolar with Vertucci type-II: A case report	32
Intan Syuhada, Trimurni Abidin, Wandania Farahanny	
14. One visit endodontic on double curvature of a left maxillary lateral incisor: A case report	35
Nuzullia, Widi Prasetya, Trimurni Abidin	

15. Management of complicated case on lateral incisor mandibular	38
Andrew Naro Mario Sipayung, Trimurni Abidin, Widi Prasetya	
16. Pain management of symptomatic irreversible pulpitis on maxillary right first premolar and first molar: A case report	41
Arbi Fadhilah, Nevi Yanti, Widi Prasetya	
17. Effect of application of calcium hydroxide and nanohydroxyapatite of duck eggshell on macrophages in reversible pulpitis (in vivo study)	43
Cahyani, Marsela Valiadanti Nugraha, Noor Hafidah Widyastuti	
18. Effect calcium hydroxide on TGF-β expression in reversible pulpitis (in vivo)	47
Noor Hafida Widyastuti, Adi Prayitno, Risya Cilmiaty, Brian Wasita	
19. Management of pulp stone in maxillary left molars with ultrasonic: A case report	50
Arini Fitria, Dini Asrianti	
20. Identification of second mesiobuccal canal in maxillary first molar using dental microscope and ultrasonic	52
Adlina Hasna Munawar, Ratna Meidyawati	
21. CAD/CAM ceramic overlay with fiber-reinforced biobase for endodontic treated tooth: A case report	55
Fajar Satrio, Ema Mulyawati, Margareta Rinastiti	
22. Management of traumatic intrusion of fractured maxillary right central incisor: A case report	58
Pradika Danu Martha, Yulita Kristanti, Margareta Rinastiti	
23. Endocrown as restoration of choice for endodontically treated lower first molar with crossbite	61
Juwita Raditya Ningsih, Aprillieza Harinda, Margareta Rinastiti, R.Tri Endra Untara	
24. Overview of carbonate apatite-gelatin (Ca-Gel) handling property result as a novel scaffold material for endodontic regeneration	64
Ratih Widyasari, Azkya Patria Nawawi, Kharennaya Novlika	
25. Management of tooth discoloration with internal bleaching on post-traumatic anterior tooth	67
Grace Victoria Octavianus, Iin Indah Aries Wati, Tamara Yuanita	
26. The maintenance of oral hygiene and caries relationship in patients with diabetes mellitus	70
Wanda Oktaria, Wilson Sukandar, Eric Priyo Prasetyo, Tamara Yuanita, Setyabudi Goenharto, Dian Agustin Wahjuningrum	
27. In-office extra-coronal bleaching technique on anterior teeth with discoloration: A case report	72
Gabrielle Sherllyana Kartono, Putu Yuri Divina, Galih Sampoerno	
28. The regularity of patient's dental visits and caries relationship in patients with diabetes mellitus	75
Zellita Frestica Rosmaida Devi Hutapea, Eric Priyo Prasetyo, Febriastuti Cahyani, Setyabudi Goenharto, Devi Eka Juniarti, Widya Saraswati	
29. Single visit endodontic treatment for the upper left posterior tooth: A case report	77
Lisa Dharmawan, Putu Yuri Divina, Galih Sampoerno	
30. One visit endodontic with internal bleaching on tooth 21 post trauma: A case report	80
Khadijah Fauzi Basalamah, Grace Angelina, Ira Widjiastuti	
31. External bleaching technique on anterior teeth discoloration: A case report	83
Dita Yuarita, Yulianti Kartini Sunur, Devi Eka Juniarti	
32. Treatment of open apex due to trauma with apexification: A case report	85
Devi Eka Juniarti, Satria Aji Prasidha	
33. Single visit endodontic followed by post crown restoration: A case report	87
Maria Febritania Wahyuni Huri, Nadia Liliani Soetjipta, Dian Agustin Wahjuningrum	

34. Endodontic retreatment of a mandibular second premolar's underfilled root canal: A case report	89
Dian Dwi Pratiwi, Meidi Kurnia Ariani, Nanik Zubaidah, Sri Kunarti	
35. Management of open apex on immature lateral incisive teeth using mineral trioxide aggregate with changes in inclination: A case report	92
Agustina Restu Nurkhotimah, Hermawan Adi Praja, Galih Sampoerno	
36. External bleaching management on discolored teeth in one visit: A case report	94
Sofi Arnesti Wahab, Reyz Pasenda Mulyadi, Widya Saraswati, Febriastuti Cahyani	
37. Endodontic retreatment in underfilled root canal of maxillary second premolar : A case report	96
Daradhasih Bestari Santiaji, Yashinta Ramadintha, Sukaton	
38. Open apex of upper central incisive apexification management with mineral trioxide aggregate – A case report	99
Daniyal Lazuardi Ramadhan, Rizky Ernawati, Galih Sampoerno	
39. Single visit endodontic on multiple canal tooth with post and overlay: A case report	102
Ogie Wijayanto, Iin Indah Aris Wati, Tamara Yuanita	
40. Single visit root canal treatment of the right lower first molar with composite resin restoration: A case report	105
Anggi Wahyu Nur Cahyani, Reyz Pasenda Muljadi, Widya Saraswati, Febriastuti Cahyani	
41. Indirect veneer using lithium disilicate as an alternative treatment for increasing aesthetic smile of teeth on diastema closure: A case report	107
Dawailatur Rahman Setiady, Yahinta Ramadhinta, Sukaton	
42. Single - visit apexification with mineral trioxide aggregates on the right maxillary central incisor: A case report of delayed care for traumatized young permanent teeth	109
Nadia Dwi Maharani, Ria Puspitasari, Kun Ismiyatin	
43. Aesthetic rehabilitation on anterior teeth: A case report	112
Larasati Kianti Putri, Reyz Pasenda Muljadi, Widya Saraswati	
44. Single visit root canal treatment with <i>lithium disilicate</i> crown restoration on upper right first premolar: A case report .	114
Fachri Halim, Eddo Supriyanto, Galih Sampoerno	
45. Management of traumatized non-vital tooth with intracoronar bleaching: A case report	117
Brian Dwi Baskoro, Saindra Arsa Gumilang, Widya Saraswati	
46. A clinical approach to management of complicated crown fracture, peg shape tooth and multiple diastema of anterior maxillary teeth	119
Karina Awanis Adla, Ratih Mahanani, Galih Sampoerno	
47. An alternative approach to restoring endodontically treated tooth	121
Wulan Tri Maulinda, Galih Sampoerno, Putu Yuri Divina	
48. Endodontic retreatment of a maxillary first with crown zirconia restoration: A case report	123
Setya Bimantara Putra, Ryza Indah Permatasari, Dian Agustin Wahjuningrim	
49. The aesthetic management of misaligned anterior maxillary teeth with indirect veneer restoration	125
Safa Pramata Andriyanti, Iin Indah Aris Wati, Tamara Yuanita	
50. Retreatment on 44th tooth with underfilled obturation: A case report	127
Ciciliya, Paramita Tanjung Sari, Galih Sampoerno	
51. Restoration direct veneer in microdontia tooth: A case report	130
Amelia Evita Puspita, Grace Angelina, Ira Widjiastuti	
52. Endodontic management of an open apex with mineral trioxide aggregate apexification: A case report	132
Amanda Andika Sari, Nadia Liliani Soetjpta, Dian Agustin Wahjuningrum	

53. Zirconia toughened alumina overlay restorations as a minimally invasive alternative for post endodontic treatment: A case report	134
Nisrina Qurrota Aini, Ria Puspita Sari, Kun Ismiyatin	
54. Apicoectomy as surgical management of chronic periapical lesion in endodontically treated maxillary central incisor: A case report	137
Aghnia Alma Larasati, Rizky Ernawati, Galih Sampoerno	
55. Diastema closure treatment with indirect veneer using lithium disilicate: A case report	139
Putu Krisnanda Pratama, Yansha Mutia Dyah Kusumastuti, Widya Saraswati	
56. Non-surgical endodontic retreatment of maxillary posterior teeth with inadequate root canal obturation: A case report	142
Muhammad Alviandi Hefni, Rizky Ernawati, Galih Sampoerno	
57. Nonsurgical retreatment of a mandibular first molar with abscess periapical	145
Salsabila Nunki Widona, Edward Irwantoro, Ira Widjiastuti	
58. Revascularization therapy in necrotic immature anterior permanent tooth due to dental caries: A case report	147
Gabriela Kevina Alifen, Devi Eka Juniarti	
59. Management of a discolored non-vital anterior tooth with internal bleaching and aesthetic rehabilitation with direct veneer: A case report	150
Fridianty Anggraeni, Ria Puspitasari, Kun Ismiyatin	
60. Regenerative endodontic procedure (REP) utilizing mineral trioxide aggregate (MTA) for mature teeth with open apex and periapical radiolucencies: A case report	153
Ayu Mutia Kurniantari, Yashinta Ramadhinta, Sukaton	
61. The relationship between cigarette smoking habit and caries in patients with diabetes mellitus	156
Aditya Arinta Putra, Shafy Shariz, Nurfahira Paidal, Eric Priyo Prasetyo, Galih Sampoerno, Setyabudi Goenharto, Dimas Prasetianto Wicaksono	
62. Periapical abscess endodontic procedure in coronary artery disease patient using combined anticoagulant and antiplatelete therapy: A case report (hospital intensive cardiology care unit inpatient)	159
Dony Cahya Firmansya, Trimurni Abidin	
63. Post-endodontic restoration with minimally invasive approach using direct fiberreinforced composite	162
Joshua Darma, Meiny Faudah Amin, Elline Ellin	
64. Management strategies of calcified and curved canal on maxillary molar	164
Theodorus Aldo Fernando, Meiny Faudah Amin, Taufiq Ariwibowo	
65. Endodontic treatment on maxillary first molar with severely curved canal	167
Indra Kanujaya, Wiena Widyastuti, Anastasia Elsa Prahasti	
66. Endodontic treatment of bull-like shaped pulp chamber	169
Josephine Priska Permatasari, Bernard Iskandar, Taufiq Ariwibowo	
67. Inclination change of endodontically treated teeth with post core crown	171
Riesta Dewi, Tien Suwartini, Dina Ratnasari	
68. Endodontic treatment of type c entomolaris on mandibular second molar	174
Calvin Reinnaldi, Wiena Widyastuti, Taufiq Ariwibowo	
69. Post core monoblock system in endodontically treated tooth- Case report	176
Stanley, Aryadi Subrata, Selviana Wulansari	
70. A 3-month follow-up of fiber post placement after MTA plug in apexification	178
Caecilia Caroline Aliwarga, Eko Fibryanto, Selviana Wulansari	

71. Healing process of rarefying osteitis after nonsurgical endodontic treatment	180
Talisa Claudiary Sinatra, Ade Dwisaptarini, Rosita Stefani	
72. Endodontic management of previously initiated therapy on first maxillary molar: A case report	180
Joseph, Ade Dwisaptarini, Melaniwati	
73. MTA apical plug as treatment on fracture necrotic immature tooth	184
Winny Moniaga, Elline Elline, Anastasia Elsa Prahasti	
74. Post-endodontic restoration on mandibular first molar with endocrown	187
Josephine Amanda Karnady, Bernard Ongki Iskandar, Anastasia Elsa Prahasti	
75. Bulk-fill composite as intraradicular retention in post-endodontic restoration	189
Yohanna Feter, Tien Suwartini, Aryadi Subrata	
76. BManagement of severely curved canal on second maxillary premolar	189
Levina Amelia, Eko Fibryanto, Dina Ratnasari	

Management of severely curved canal on second maxillary premolar



Levina Amelia¹, Eko Fibryanto^{2*}, Dina Ratnasari²

ABSTRACT

Introduction: Root canal of the tooth often shows complex configurations that complicate the root canal treatment. Curved root canals cause difficulty in cleaning, shaping, and obturation. Complications that can occur include ledges, fractured instruments, canal blockages, zips, and perforations. This case report aims to provide a procedure for completing endodontic treatment of severely curved root canals.

Case Illustration: A 18-years old male patient came to Dental Hospital Faculty of Dentistry, Universitas Trisakti with a major complaint of spontaneous pain on the right maxillary second premolar. The clinical examination revealed a caries lesion on the mesial aspect with an exposed to pulp chamber. The tooth responded to thermal test and showed sign of tenderness. After measurements using Schneider's method, it was found that the curvature was in the severe category (34 degrees). The root canals were negotiated using pre-curved stainless steel #6 and #8 K-files, followed by glide path preparation using 13/.02 and 16/.02 rotary files. Biomechanical preparation was done using blue heat-treated files until size 25/.06. Continuous irrigation using 5.25% sodium hypochlorite was performed at every file change. Sonic activation at the final irrigation was performed to create an acoustic streaming effect and optimize the flushing of debris from the apical third. The root canal was obturated with warm vertical compaction technique, and the tooth was restored using fiber-reinforced composite resin. At 3 months follow-up, the tooth shows no symptoms and functions normally.

Conclusion: A proper and appropriate approach is needed in the treatment of severely curved root canals to achieve a successful endodontic treatment.

Keywords: Blue-heat treated, pre-curved files, severely curved root canals.

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INTRODUCTION

It is not always easy to see how a root canal should be configured. In the event of iatrogenic errors, the dentist must select the appropriate devices for the management of curved canals based on precise knowledge of the tooth structure and degree of curvature. The tooth's root canal frequently has complicated configurations that make the root canal therapy more difficult. Cleaning, shaping, and obturation are challenging procedures for teeth with curved root canals. The following complications can happen are perforations, canal obstructions, ledges, broken tools, and zips. The purpose of this case study is to present a method for finishing endodontic therapy on root canals with extreme curvature.

CASE ILLUSTRATION

An 18-year-old male patient came to Dental Hospital Faculty of Dentistry, Universitas Trisakti with a major

complaint of spontaneous pain on the right maxillary second premolar. A caries lesion on the mesial aspect with an exposed pulp chamber was discovered during the clinical examination. The tooth responded to a thermal test and showed signs of tenderness. Schneider's technique measurements revealed that the curvature fell into the severe category (34 degrees). An isolation cavity was set up after the use of rubber dams and anesthesia. Pre-curved stainless steel #6 and #8 K-files with the degree of curvature visible on the radiograph were used to traverse the root canals. Determined the 6# K file up to the radiographic working length. Estimated length until the instrument's curvature was marked, at which point coronal flaring was completed. An apex locator was then used in each canal to establish the working length. In cases where the coronal flaring and canal straightening caused a decrease in the working length as estimated by the radiography, the 6# K file continued to be used until the radiographic working length was reached, and then the 10# K file

was introduced. To maintain the canal's original shape and stop the instruments from traveling to the apical side of the apical foramen, precurve the file before putting them. Glide path preparation using 13/.02 and 16/.02 rotary files came next. Blue heat-treated files were used for biomechanical preparation up to size 25/.06. Every file change was accompanied by continuous irrigation with 5.25% sodium hypochlorite. To maximize the removal of material from the apical third and provide a streaming effect, sonic activation was carried out during the last irrigation. A heated vertical compaction technique was used to obturate the root canal, and fiber-reinforced composite resin was used to the tooth. After three months, there are no symptoms and the tooth is functioning normally.

DISCUSSION

Accessing curved canals in a straight path is crucial. Endodontic files are not required to bend before entering the

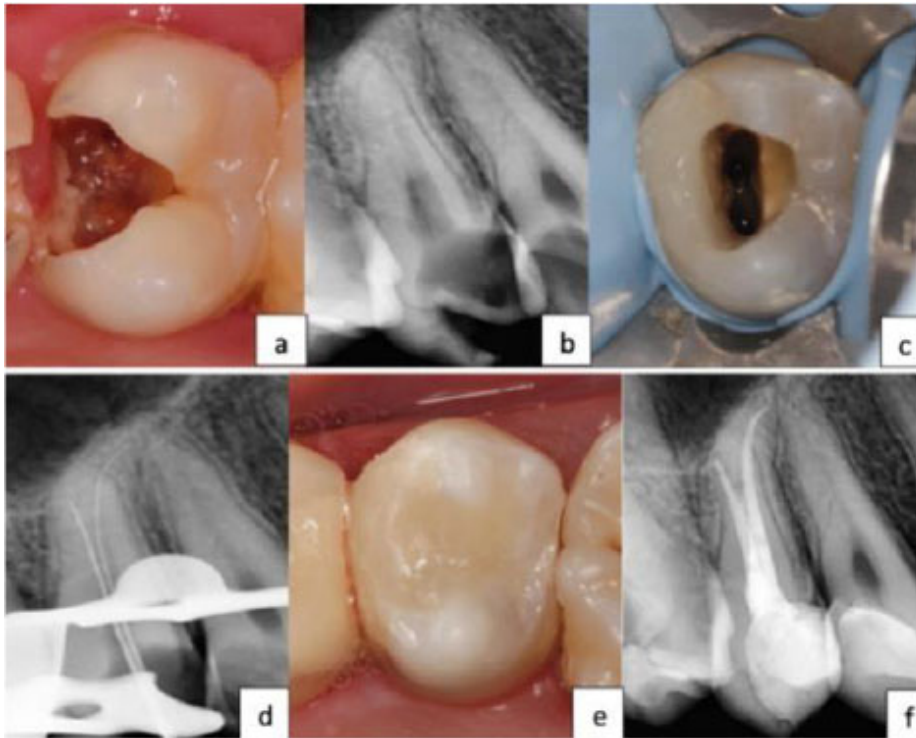


Figure 1. (a) and (b) Pre-operative, (c) Access opening, (d) Working length confirmation using a radiograph. (e) and (f) After obturation and direct restoration using fiber-reinforced resin composite.

canal, which lessens the strain on them. During the procedure, ultrasonics is used to conservatively improve the form of the access cavity. To prevent instrument fracture, it is imperative to establish a clear glide path using hand files prior to utilizing rotary files. Start with safe-ended, tiny hand files. Before inserting any hand files into the canal, give them a pre-curve. Pre-curved files are more effective at navigating curves than straight files. To precurve, a progressive curve is placed along the whole length of the file, and near the apical end of the instrument, a sharp curve measuring almost 45° is placed.¹ Instead of following the canal's curvature, a straight file's point is more likely to leave a ledge behind. It might be necessary to approach a highly curved canal in phases. Before attempting to maneuver around the bend, prepare the canal using hand and rotary files. This marginally expands the hand file's footprint and improves the tactile feedback the tip provides. When preparing curved canals, a flexible rotary file system that respects the architecture of the canal is used for cleaning and shaping. Sodium hypochlorite irrigation on a regular basis helps keep debris out of the

canal. Using small hand files (sizes 6–10) to maintain patency and recapitulate regularly is crucial. Blockages can occur as a result of debris building up quickly. This may result in iatrogenic mistakes.² Recent developments in dentistry have led to the use of rotary devices with heat-treated nickel-titanium (NiTi) files to tackle the intricate anatomy of root canals. The high rigidity of the NiTi instruments helps to provide strong lateral forces in curved canals and gets better with increasing instrument size. The flexibility, effectiveness, and cutting capacity of NiTi rotary files have made them a preferred tool for shaping root canals.³ For the preparation of root canals, nickel-titanium (NiTi) devices have been and remain frequently utilized. These tools' flexibility is a huge advantage since it makes the process of creating curved canals more predictable. However, the prognosis of the endodontic therapy is compromised in these circumstances due to the possibility of torsional fracture and/or cyclical fatigue. Various alloys and instrument components have been suggested to improve fatigue resistance and flexibility. A significant

advancement in the mechanical qualities of the instrument that has led to a safer and more precise root canal preparation is the thermal treatment of NiTi alloys. In addition to increasing predictability and efficiency and reducing procedural errors— particularly in curved canals— the use of NiTi rotary files for root canal preparation made it possible to create consistently tapered preparations.⁴

CONCLUSION

A successful endodontic treatment for severely curved root canals requires a proper and appropriate approach.

CONFLICT OF INTEREST

The authors declare that there are no competing interests.

ETHICAL CLEARANCE

Written informed consent for publication of clinical details and clinical images was obtained from the patient and parent.

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AUTHORS CONTRIBUTION

Levina Amelia: Writing- Original draft preparation. Eko Fibryanto: Supervision, Writing- Reviewing and Editing. Dina Ratnasari: Supervision, Writing- Reviewing and Editing. All authors read and approved the final manuscript.

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