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Getting to The Roots of Endodontic
Towards Asean Economic
Community
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SEMINAR ILMIcAH INTERNASIONAL
IKATAN KONSERVASI GIGI INDONESIA

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"Getting to The Roots of Endodontic Towards Asuan Economic Community"

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Periradicular Surgery as an Alternative Treatment for Overfilling Of a Root Canal Filling Material: A Case Report

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ABSTRACT
Overfilled gutta-percha can lead to failure of root canal treatment. Management of overfilled gutta-percha may require non-surgical procedures or can be managed by periradicular surgery with root end procedures. Periradicular surgery is indicated in case of significant overextension of filling material resulting in periradicular pathosis with symptoms. The aim of periradicular surgery is to remove the periradicular pathosis and restore health and function of tooth and periodontium. A 23-year-old female patient was referred with a chief complaint of mild pain and discomfort in the area of her anterior maxillary. Radiographic examination showed extruded gutta-percha extending into periapical radiolucency. Retreatment and endodontic surgery are the treatment of choice. After 2 month follow-up, the patient was clinically asymptomatic with radiographic examination showed periapical healing.

INTRODUCTION
Non-surgical root canal therapy is a highly successful procedure if the diagnosis is correct and technical aspects are carefully performed. If root canal therapy failed, the best corrected are by retreatment. Studies have shown that more than two thirds of retreatment after original therapy are successful¹. However, in some situations surgery is needed to retrain a tooth that would otherwise be extracted¹,². Surgical root canal therapy, including root-end resection, has been practiced since at least the mid-1800s. In 1906, Schamberg described using radiographs to assist diagnosis and using surgical burs to perform a rapid osteotomy and root-end "ablation."¹

Periradicular surgery, over the past 2 decades, has continued to progress into precise, biologically based adjunct to nonsurgical root canal therapy². The parallel development of new instruments and materials, aided by enhanced illumination and magnification along with a better understanding of the biology of wound healing, has made periradicular surgery a viable alternative to extraction and tooth replacement³.
The purpose of this article is to report a clinical case of overfilling gutta-percha that was found extruded into periapical, resulted in symptomatic chronic inflammatory reaction within bone and soft tissue.

CASE SUMMARY

A 23-year old female patient came to clinic of conservative dentistry Universitas Indonesia.

There was history of continuous pain and discomfort in the area of her maxillary anterior incisive, happened about 6 months ago. Because of presumed endodontic failure (fig. 1a), the former dentist took an endodontic retreatment. Unfortunately, a small amount of gutta-percha has extruded into periapical. However, the pain persisted in the same region and as a result, was referred to us.

Clinically, there were temporary crowns which not well adapted, swelling located in the left anterior maxillary area between vestibular sulcus and nasal floor, 0.5 cm beyond the border of attached gingiva (fig. 2). The swelling was painful on palpation. Radiographic examination showed extruded filling material beyond 2 mm apex opening. The extruded filling material was 3 mm in length (fig. 1b).

Fig. 1. Preoperative periapical radiograph. (a) Periapical radiograph after post preparation. However, 21 showed about 6 mm of grossly overfilled GP extending into large periapical radiolucency. (b) Failure of GP retraction with Hedstrom file on previous treatment causing extruded GP.

Fig. 2. Clinical view of maxillary left lateral incisor. Noted swelling located in the left anterior maxillary area.

The tooth, 11 and 21, was planned to receive a root canal retreatment and to remove the lesion and endodontic filling material surgically, and also to perform apicoectomy under local anaesthesia. Retreatment by removal of gutta-percha filling using Hedstrom files and solvent (eucalyptus oil). Cleaning and shaping of roots canal was performed using universal Protaper hand use (Dentsply Mailfer, Switzerland) accompanied by the use of EDTA gel as lubricant (RC-Prep, Premier®)
Dental Product company). Root canals were intermittently and copiously irrigated with NaOCl 2,52% and EDTA 17% after each instrument change using a notched tip irrigating needle (proRinse, Dentsply Mailfeber, Switzerland). Sonic irrigating technique was also used EndoActivator, Dentsply Mailfeber, Switzerland) to improve the efficacy of irrigating solution. Next appointment—a week later, root canal obturation was taken using system—B heat source technique. Then, a post-obturation radiograph was taken (fig 3).

Fig. 3 Non-surgical root canal retreatment have been carried out instead: a favourable outcome in the end despite all the iatrogenic damage the roots of booth teeth.

After the initial radiographic and tomographic procedures, the endodontic surgery was performed. Pre-operative disinfection using chlorhexidine gluconate 0,2% (Minosep, Minorock) for one minute. Following adequate local anesthesia using pehacain® inj and surface disinfection of the surgical site, a large buccal mucoperiosteal flap was raised. Incision was made with no 11 blade. The flaps were rectangular, full thickness and consisted of two releasing vertical incisions and a horizontal incision. A primary incision is made in the gingival sulcus and follows the contours of the teeth. The vertical incisions were placed in distal 11 and distal 22. The two releasing incisions were connected by a sulcular horizontal incision involving interproximal spaces to free the buccal from the palatal papilla with a complete mobilization of the buccal papilla, and then thin cortical bone over the lesion was removed to allow access to the lesion (fig. 4).

Fig. 4 Rectangular, full thickness flap

Osteotomy was obtained using a round bur in a straight slow hand piece with saline irrigation (fig. 5a). The granulation tissue was gently lifted away and curetted out using scraping motion. Following curettage, extruded gutta-percha became evident and was removed using a curettage (fig. 5b).

After exposure of the root end, a straight fissure bur in a hand-piece was positioned perpendicular to the long axis of the root and then beginning from the apex, cutting coronally, 2.5 mm of the root-end was removed. The root-end cavities were
prepared using zirconium nitride retrotips (Dentsply Maillefer Instruments, Bal- 
laiges, Switzerland) driven by an ul-
trasonic device unit (Piezon Master 600, 
EMS, Nyon, Switzerland) under constant 
copious sterile water irrigation to avoid 
over-heating. The retro-tips allowed a 
well-defined parallel preparation of to 3 
mm deep (fig. 5c). Root-end cavities were 
then dried using paper points. To improve 
visualization of the surface of the cut 
root-end, a polished stainless steel and 
sapphire glass micro mirror was available 
(fig. 5d).

Finally Biodentin™ (Super Seal, 
Ogna Pharmaceuticals, Milan, Italy) was 
used as the root-end filling material. For 
performing root-end management proce-
dures an operating microscope was used. 
To confirmed the depth and density of the 
root end filling, a radiograph was taken 
with the flap held loosely. The bone 
cavity was packed with a resorbable graft 
material (Batan, Indonesia) and before the 
flap was close, The osteotomy site was then 
gently curetted and irrigated with saline to 
remove any remnants of hemostatic agents 
and packing materials. The patient was 
prescribed antibiotics (Amoxicilin, 625 mg/
day) and analgesics (arcociax, 90 mg/day).

Fig. 5 Intraoperative clinical view. (a) 
Osteotomy using round bur in a straight 
low handpiece with saline irrigation. (b) 
Periradicular curetage of a large lesion 
and extruded GP. (c) Ultrasound and 
specially-designed surgical tips are used 
to prepare the root-end cavity. (d) Micro-
surgical mirror used to examine the cut 
root face.

DISCUSSION

The first and most important step in 
treatment decision making is determin-
ing the cause of persistent periradicular 
pathosis1,2,3. Although the presence of 
microbial infection is the primary cause 
of root canal failure in well-treated teeth, 
foreign body reaction to extruded root 
canal filling materials can maintain the 
disease and symptoms1. Nonsurgical re-
treatment is believed to be the preferred 
first approach in the management of per-
sistent periradicular pathosis, therefor, 
surgery is indicated for teeth with persis-
tent periradicular pathosis when nonsur-
gical retreatment is impractical or has 
previously failed2,3. However, surgical 
root canal treatment should not be con-
sidered as somehow separate from nonsurgical treatment, although the instruments and techniques are different. In this case, conventional endodontic retreatment has attempted to remove gutta-percha from the canal. But it was failed and the patient still felt discomfort at that region, therefore periradicular surgery was the treatment of choice.

The most common practice in endodontics is to obturate the canal system with gutta-percha and sealer. Few clinical observations demonstrate that overfilling with gutta-percha, sealers or both can result in clinical symptoms and pain when extruded beyond the confines of the root canal system. Overfilled or extruded filling materials could be displaced or migrate into the adjacent soft tissue or bone and cause symptoms. Therefore a clinician must carefully measure and obturate canal systems using apex locator devices and radiographs to confirm working lengths. Radiographic examination is an essential component in all aspects of endodontic treatment, from diagnosis and treatment planning to assessing outcome. Information gained from conventional films and digital periapical radiographs is limited by the fact that the three-dimensional (3D) anatomy of the area is compressed into a two-dimensional (2D) image. As a result of superimposition, periapical radiographs reveal limited aspects of the 3D anatomy. In addition, there may also be geometric distortion of the anatomic structures imaged. These problems may be overcome using cone-beam computed tomography (CBCT).

Many of the commonly used anaesthetic agents are able to provide profound and long-lasting anaesthesia and also contain a vasoconstrictor that may limit blood flow to the soft tissue of the surgical site. Without adequate haemostasis, the operator’s visibility is impaired and the procedure may take longer than necessary or even iatrogenic procedural accidents may result. The use of 2% mepacain with 1:80,000 adrenaline for buccal, palatal or lingual infiltrations is considered the gold standard as mentioned by Kim et al. in 1997.

There are many different flap designs that have been used in endodontics. Flap design affects access, visibility, anatomical structures, repositioning, suturing, postoperative care of the surgical site, and postoperative sequelae. Flap design plays an important role as to how much recession will occur after surgery. Rectangular flap with two releasing incision will provide greater surgical access. Minimal trauma should be inflicted during incision, elevation and reflection of the tissue flap. Both reflected and unretracted tissue should be kept moist. Papilla-base incision has been suggest to preserve the interdental papilla and reduce post-surgical recession.

After the flap was reflected, the root-end has to be located and uncovered. In this case, there was no bony fenestration,
then the approximate location of the root-end was using pre-operative radiograph and CBCT\textsuperscript{8}. The overlying bone will then have to be removed in order to expose the root-end. Bone removal was carried out using round surgical bur in low speed hand-piece and with sterile saline irrigation to avoid over-heating.

The aims of Root end preparation is to achieve a retrograde cavity with retentive or parallel walls in the long axis of the tooth in order to retain the chosen biocompatible filling material. Also its purpose is to include all the fistula\textsuperscript{6}. Preparation using ultrasonic device improves outcome in apical surgery, with the aim of removing 3 mm of root filling material. With the introduction of the intraoral microscope, root-end resection at

90\textdegree and apical preparation using an ultrasonic retro tip to the depth of 3 mm, this allowed a success rate of over 90\% as demonstrated by Tsesis et al. in 2006\textsuperscript{6}. The use of the dental operating microscope has also been shown to be of benefit during surgery by Pecora et al. in 1993\textsuperscript{7}.

The material of choice for root end filling material, due to its biocompatibility, ability to induce hard tissue formation (bone, cementum), reduced leakage and inflammation in contact with the living tissues. Biodentine\textsuperscript{TM} (Septodont), is a powder consisting of a biocompatible material with a tricalcium silicate core, which has superior handling properties to MTA, and exhibits similar biocompatibility\textsuperscript{11}. More long term follow up studies are needed in order to establish firmly the qualities of this material. One of the possible drawbacks of Biodentine\textsuperscript{TM} is its reduced radio-opacity, which makes this material difficult to assess on a post-operative radiograph. At this stage a post-operative radiograph will help in assessing the apical restoration at the surgical site prior to the closure of the wound and will act as a reference for assessing future healing\textsuperscript{6,12}.

![Post-operative clinical view](image1)

**Fig. 5** Post-operative clinical view. (a) After flap was gently eased back into place and then sutured. (b) Two-week follow-up view showing good soft-tissue healing. (c) All ceramic crown was cemented as the final post-endodontic restoration. (d) Clinical view after two-month follow-up.

![Maxillary central incisor](image2)

**Fig. 6** Maxillary central incisor. (a) Post-operative radiograph following periradicular surgery showing a well-adapted Biodentin\textsuperscript{TM} root-end filling. (b) Radiograph after one week post-surgery.
(c) Recall radiograph two months post-
surgery, evidence of bony healing and
tooth is symptom-free.

CONCLUSION

Although the presence of microbial
infection is the primary cause of root ca-
nal failure in well-treated teeth, foreign
body reaction to extruded root canal fill-
ing materials can maintain the disease and
symptom. This case suggests that gutta-
percha may cause an inflammatory reac-
tion and pain when extruded beyond the
confinement of the root canal system.

Modern periradicular surgery is suc-
cessful in promoting healing in periapical
lesions of endodontic origin. Thus, Peri-
radicular surgery can be the treatment of
choice to manage endodontic failure as-
associated with over instrumentation and
overfilled gutta-percha. It will improve
the prognosis of the tooth and increase the
survival chance of the tooth. Radiograph
examination after 2 months follow-up
showing a successful treatment of this
case.

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