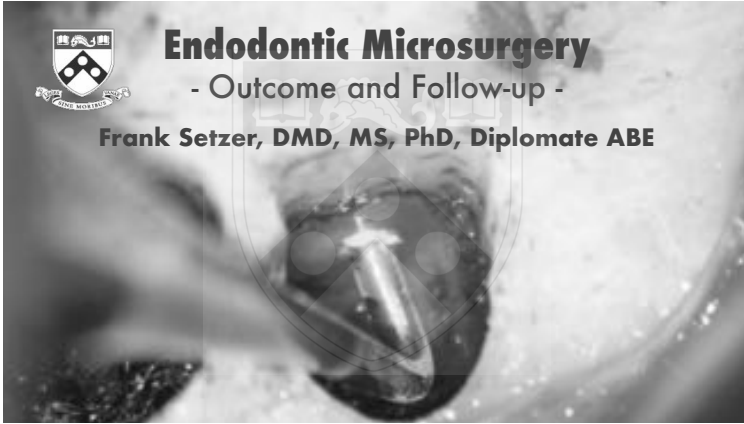




Endodontic Microsurgery

- Outcome and Follow-up -

Frank Setzer, DMD, MS, PhD, Diplomate ABE



Overall Outcome

Other Factors affecting Outcome:

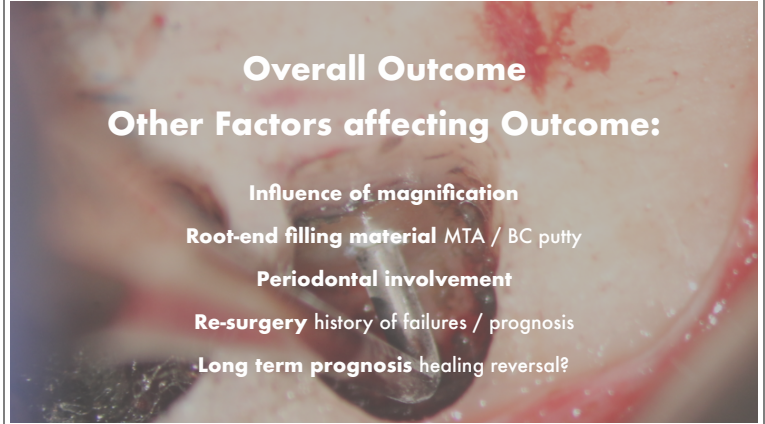
Influence of magnification

Root-end filling material MTA / BC putty

Periodontal involvement

Re-surgery history of failures / prognosis

Long term prognosis healing reversal?



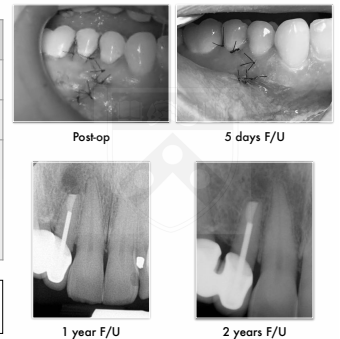
Postoperative Instructions

- 1) **Do not brush area of surgery on the day of surgery.** Use small Q-tip with mouth rinse to clean carefully. Brush everywhere else.
- 2) **Leave surgical area alone.** Do not raise the lip in front of mirror and "inspect" - let tissues heal
- 3) **Do not smoke for at least one week** - this is your time to quit smoking !!!
- 4) **Do not overactively rinse** your mouth.
- 5) **Soft diet** for first few days.
- 6) **Ibuprofen, Chlorhexidine rinse, [Amoxicillin if needed].**
- 7) Get advice from the office if any problems arise.

Follow-up Schedule

Time Period	Treatment
Night after the surgery	Call the patient to check and ensure
3-7 days	Clinical check and suture removal
1 year	Clinical check and radiographic follow-up
2 years	
4 years	

Adjust based on individual procedure and/or patient needs



General Factors

Pain & Symptoms

Yes

Lower success rates with preoperative pain, tenderness and presence of a sinus tract.

von Arx T et al., IEJ 2010; Kreisler et al., Quintessence Int. 2013

No

No difference in outcome with preoperative pain.

Peñarrocha et al. Med Oral Patol Oral Cir Bucal. 2008; Song et al., J Endod 2011; von Arx T et al., J Endod 2012

Medical History

Yes

Bleeding disorders
Coumadin (Marcumar)
Epinephrine "allergy"
Cardiac Patient
Aspirin

Hemostasis

Age / Gender

No

Age / gender may not play a role.
Only two studies with actual, but controversial results for age, only one study better in males.

Barone et al., J Endod. 2010; Kreisler et al., Quintessence Int. 2013; Peñarrocha et al., J Oral Maxillofac Surg. 2007

Endodontic Outcome

Endodontic Outcome



Primary Endodontic Failure

All Endo
Failure 16% [historical data]

Apical Periodontitis only
Failure 26% [historical data]

Generally strict criteria: Strindberg or PAI index

Endodontic Outcome



Retreatment Failure

Strict or "loose" criteria

Overall: ~23% [historical data 1961-2005]
Weighted Pooled Success Rates - Ng et al., IEJ, 2008

but...

Apical PA & Root Canals non-negotiable:
60%!!! Four different groups PAP/Access 7%-60% failure
Gorni & Gagliani, JOE, 2004

Failed despite non-surgical retreatment

Scientific Success - No detectable disease

Endodontics IS microbial control : progress is more efficient control of microbes.

Hypothesis:

Removal of intracanal infection will result in success whatever the detector method !

Intraradicular infection 90-95 %

Problems: Difficult Anatomy, Previous Treatment, Infected Dentin, Biofilm

Problem: The Etiology of the Apical Periodontitis

Inflammation



Scar Tissue

very few
Nair 1999

True Cyst

> 5 %
Nair 1990

Foreign body reaction

very few
Koppang 1989, Nair 1990, Sjogren 1993

Extraradicular infection

2-5 %
Sandakul 1980, Sjogren 1988, 1992, Whymann, translated 1989

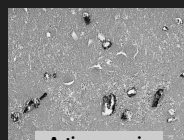
Intraradicular infection

90-95 %
Nair 1990

Apical Periodontitis

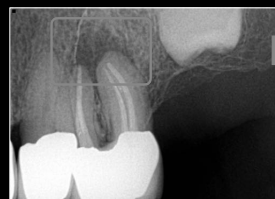
Abscess	12%
Granuloma	73%
True Cyst	9%
Pocket Cyst	6%

Nair PMR, Periodontol 2000, 1997



Actinomycosis
Propionibacterium propionica

Healing Assessment?



Histology & Radiography

Modes of healing histologically after endodontic surgery in 70 cases

Correlation between histology and radiography in the assessment of healing after endodontic surgery

Radiographic criteria for the assessment of healing after endodontic surgery

Human Study***

The biopsy technique used was that described by Nygaard-Östby (1948). With a thin surgical bur a block was removed including the apex and surrounding periapical soft tissues and bone.

1972

Jørgen Rud



Jens Ove Andreassen



COMPLETE HEALING (success)

Radiography

- Reformation of a periodontal space
- Lamina dura can be followed around apex
- Width of PDL space in the apical region may be widened up to twice the normal width around non-involved parts of the root.
- A tiny defect in the lamina dura (maximum 1 mm²) adjacent to the root filling is tolerated



Histology

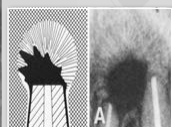
Rud, Int. J. Oral Surg 1972

INCOMPLETE HEALING (success) -SCAR TISSUE

Radiography

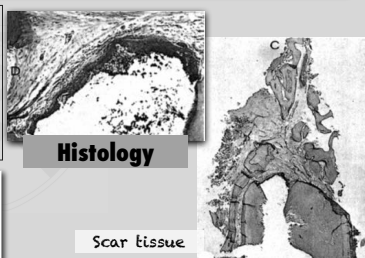


- A rarefaction that - compared to a previous radiograph - can be seen decreased in size or remained stationary.
- Bone structure may or may not be recognized in the rarefaction.
- The periphery is irregular.



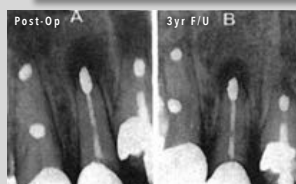
Histology

Scar tissue

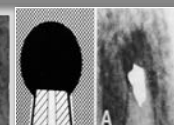


Rud, Int. J. Oral Surg 1972

UNCERTAIN HEALING (failure)

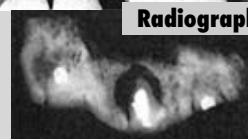


Radiography



Histology

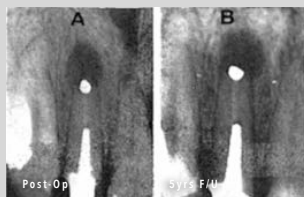
- Some degree of bone regeneration, with the original rarefaction decreased in size.
- Size of the rarefaction should be more than twice the width of the PDL.



Rud, Int. J. Oral Surg 1972

UNSATISFACTORY HEALING (failure)

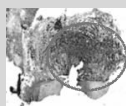
- Radiographic signs as for uncertain healing, but the rarefaction is either enlarged or unchanged in comparison with a previous radiograph.



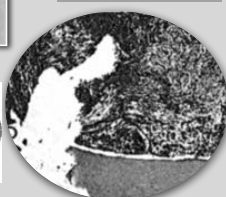
Radiography



Histology

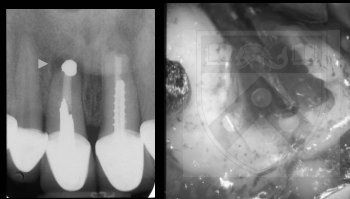


Severe inflammation



Rud, Int. J. Oral Surg 1972

Endodontic Outcome Traditional Root-End Surgery (TRS)



Outcome of Endodontic Surgery: A Meta-analysis of the Literature—Part 1: Comparison of Traditional Root-end Surgery and Endodontic Microsurgery

Frank C. Setzler, DMD, PhD, MS, Svetla B. Shah, BDS, DMD, Meeta R. Kohli, BDS, DMD, Bekir Karabucak, DMD, MS, and Syngcak Kim, DDS, PhD

Success: **59.0%** [95%CI (0.55,0.6308), n=925, 12 studies]
Systematic Review and Meta-Analysis — Setzler et al., JOE 2010

Traditional Surgery: No magnification or below x4 (mostly naked eye), root-end preparation performed by burs, amalgam



Validated ???

Traditional Root-End Surgery (TRS)

2008

Gedeponeerde afbeelding

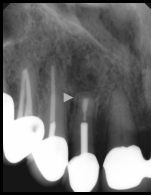
M.A. Bronckhorst, C.J. Bagg, M.A. Van't Hof-Grootenboer, M.A. Bovenhuis, M.A.M. van't Hof

Gebruik van vulmaterialen bij een chirurgische apicale endodontische behandeling in Nederland

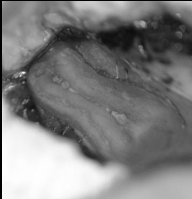
Questionnaire to **all practicing Dutch oral surgeons** (n = 195) which materials were used for retrograde fillings. Response rate 77%. IRM was the retrograde filling material most widely used by the Dutch O&MF surgeons (47.6%), **Amalgam, with 35%, was second.**

Bronckhorst et al., OB 2008

Endodontic Outcome



Endodontic Microsurgery (EMS)



Outcome of Endodontic Surgery: A Meta-analysis of the Literature—Part 1: Comparison of Traditional Root-end Surgery and Endodontic Microsurgery

Frank C. Setzer, DMD, PhD, MS, Suveta B. Shah, BDS, DMD, Meeta R. Kohli, BDS, DMD, Bekir Karabucak, DMD, MS, and Syngook Kim, DDS, PhD

Success: 93.5% [95%CI (0.8889,0.9816), n=699, 9 studies]

Systematic Review and Meta-Analysis — Setzer et al., JOE, 2010

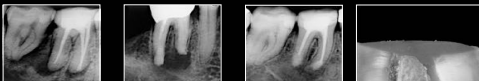
Microscopic Surgery: High power illumination and magnification (x10 and above), ultrasonic preparation and MTA, Super EBA or IRM



Endodontic Outcome

Resin-Based Techniques (RES)

EDTA- GLUMA- RETROPLAST



Retroplast: concave preparation with bur, lens shaped bonded filling



microscope

resin based

Concave preparation

Success - 92%

Rud, IEJ 2001

~82%

4 year follow-up

Success - 73%

Jensen, COI 2002

Mandates no contamination

Fairly large amount of bone destroyed

Toxicity of monomer

Problem with long-term follow-up:

Dissociation of filling material due to technical sensitivity

Endodontic Outcome

Non-Microscopic Contemporary Surgery (CRS)




Outcome of Endodontic Surgery: A Meta-analysis of the Literature—Part 2: Comparison of Endodontic Microsurgical Techniques with and without the Use of Higher Magnification

Frank C. Setzer, DMD, PhD, MS, Meeta R. Kohli, BDS, DMD, Suveta B. Shah, BDS, DMD, Bekir Karabucak, DMD, MS, and Syngook Kim, DDS, PhD

Success: 86.5% [95%CI (0.8520,0.9080), n=610, 7 studies]

Systematic Review and Meta-Analysis — Setzer et al., JOE, 2012

significantly different from EMS for molars and premolars!

Non-Microscopic Contemporary Root End Surgery: No high power magnification (x4-x10 [loupes]), ultrasonic preparation and MTA, Super EBA or IRM



Outcome Meta-Analyses

All Techniques Overview

Author, Journal, Year	Study Design	Statistical Analysis	Outcome	Subgroup	Number and time range of included studies
Kang et al., COIR 2015	Systematic Review & Meta-Analysis	weighted pooled success rates	95.0%	<2 years follow-up	11 studies (1999-2013)
			90.4%	2-4 years follow-up	
			82.5%*	>4 years follow-up	
Tsesis et al. J Endod. 2013			89.0%	(4-10x [loupes], US, IRM+eEBA-MTA) (10-25x, US, IRM+eEBA-MTA)	18 studies (1999-2011)
Setzer et al., J Endod. 2010, 2012			TRS 59.0% CRS 86.5% EMS 93.5%	[0x, bur, amalgam] (4-10x [loupes], US, IRM+eEBA-MTA) (10-25x, US, IRM+eEBA-MTA)	12 studies (1979-1995) 7 studies (2000-2007) 9 studies (1999-2008)
Tsesis et al. J Endod. 2009			91.6%	(4-10x [loupes], US, IRM+eEBA-MTA) (10-25x, US, IRM+eEBA-MTA)	11 studies (1999-2008)
Torabinejad M et al. J Endod. 2009			77.8%	2-4 years follow-up	16 studies (1970-2008)
			71.8%	4-6 years follow-up	7 studies (1972-2004)

* only two studies, 88% and 76% (includes Retroplast)

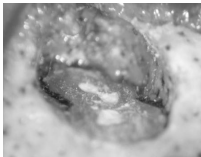
EMS ≥90% [Endodontic Lesions]

Root-End Filling Material

Yes

MTA equal to IRM

Song et al., J Endod. 2011



Mineral Trioxide Aggregate (MTA) is an ideal root-end filling material providing a physical and biological double seal at the resected root surface.

Kim & Kratchman, J Endod. 2006; Peñarrocha et al., J Oral Maxillofac Surg. 2007; von Arx et al., J Endod. 2010; Barone et al., J Endod. 2010; Song et al., J Endod. 2011; Liebhich, Dent Clin North Am. 2012; von Arx et al., J Endod. 2012; Pop I, Br Dent J. 2013; Siqueira et al., Br Dent J. 2014; Chong & Rhodes, Br Dent J. 2014

Mineral Trioxide Aggregate (MTA) is superior as a root-end filling material to glass ionomer, IRM, super EBA, or composite.

Song et al., J Endod. 2011; Pop I, Br Dent J. 2013; Chong & Rhodes, Br Dent J. 2014

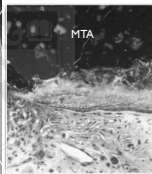
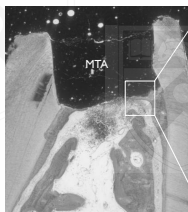
MTA superior to Retroplast, SuperEBA

von Arx et al., J Endod. 2010; von Arx et al., J Endod. 2012

Root-End Filling - MTA



proven root-end filling material >20 clinical studies



MTA perforation in-vivo (animal)

Penn 2005, Boek et al., JOE 2005

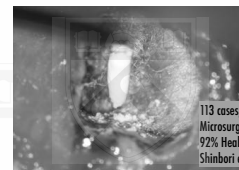
MTA

Tricalcium silicate
Dicalcium silicate
Tricalcium aluminate
Tetracalcium aluminoferrite
Bismuth oxide

Root-End Filling - MTA versus RRM (Root Repair Material; Bioceramic Putty)



proven root-end filling material >20 clinical studies



113 cases, Endodontic Microsurgery with RRM; 92% Healing Rate
Shinbori et al., JOE 2015

MTA

Tricalcium silicate
Dicalcium silicate
Tricalcium aluminate
Tetracalcium aluminoferrite
Bismuth oxide

RRM

Calcium silicate
Calciumphosphate monobasic
Calcium Hydroxide
Zirconium Oxide
Tantalum Oxide

Shinbori et al., JOE 2015

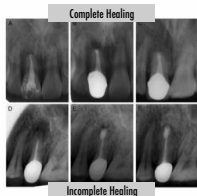
CONSORT Randomized Clinical Trial

Comparison of Mineral Trioxide Aggregate and iRoot BP Plus Root Repair Material as Root-end Filling Materials in Endodontic Microsurgery: A Prospective Randomized Controlled Study

Wei Zhou, DDS, Qinghua Zheng, DDS, PhD, Xiaohua Tan, DDS, Dongzhe Song, DDS, Lan Zhang, DDS, PhD, and Dingming Huang, DDS, PhD



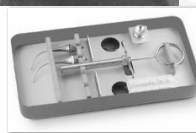
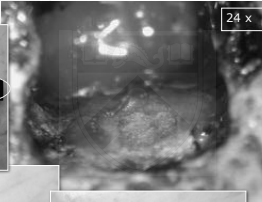
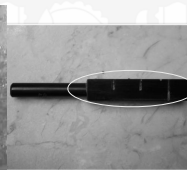
Prospective randomized controlled study evaluating the clinical and radiographic outcome of endodontic microsurgery when using **Root Repair Material (BP-RRM)** or **mineral trioxide aggregate (MTA)** as the retrograde filling material. **12 months follow-up** including clinical and radiographic examination. Results suggested that **BP-RRM is comparable with MTA in clinical outcome when used as root-end filling materials in endodontic microsurgery.**



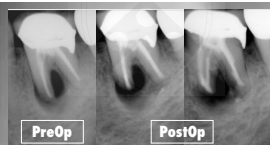
Category of healing	MTA (n=87)		RRM (n=71)		Total (n=158)	
	n	%	n	%	n	%
Complete healing	62	71.3	53	74.6	115	72.8
Incomplete healing	19	21.8	14	19.7	33	20.9
Unsatisfactory healing	6	6.9	4	5.6	10	6.3
Σ Success	87	93.1	71	94.4	158	93.7

Zhou et al. JOE 2015

Root-End Filling MTA



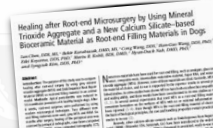
Root-End Filling - RRM



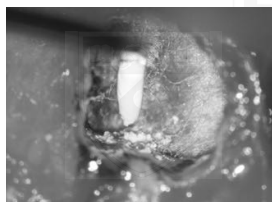
Mid 8-16x

Frank Setzer, Philadelphia, PA

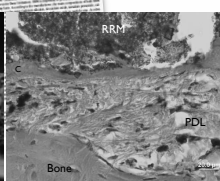
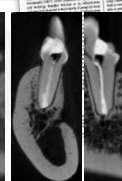
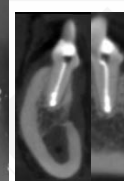
Root-End Filling RRM



in-vivo (animal)



MTA versus RRM
Healing after root-end surgery in-vivo (animal)



CBCT

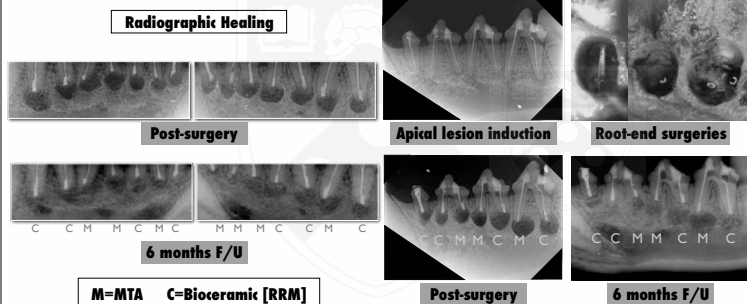
Micro-CT

Histology

Ian Chen, Master's Thesis, Penn 2014, Chen et al., JOE 2015

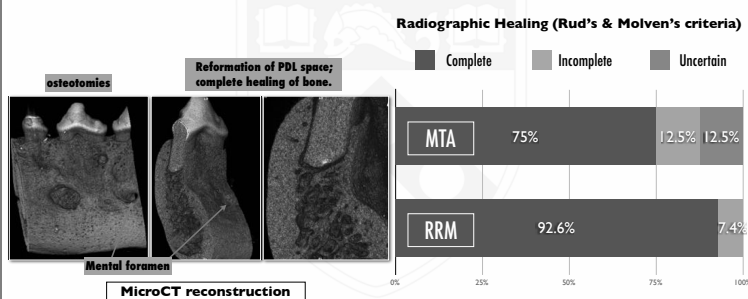
Root-End Filling RRM

in-vivo (animal)



Root-End Filling RRM

in-vivo (animal)



Root-End Filling RRM PENN 3D Criteria - CBCT

Randomized clinical trial: in-vivo (human)

PENN 3D Criteria (surgical)	
Complete Healing	Success
Limited Healing	
Unsatisfactory Healing	Failure

July 2011-May 2014; 243 randomized patients

101 patients; 44.5%; 15 mo

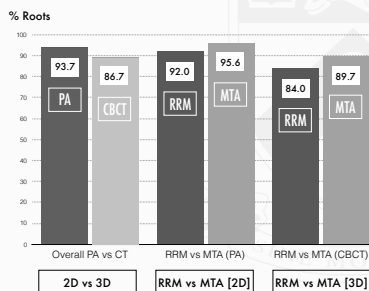
125 patients lost at F/U; 17 due to extraction (other)

68 MTA - 143 roots - 75 RRM

Chafic Safi, Master's Thesis, Penn 2015

Root-End Filling RRM PENN 3D Criteria - CBCT

Randomized clinical trial: in-vivo (human)



July 2011-May 2014; 243 randomized patients

101 patients; 44.5%; 15 mo

125 patients lost at F/U; 17 due to extraction (other)

68 MTA - 143 roots - 75 RRM

No statistically significant differences between 2D vs 3D overall, nor between RRM vs MTA.

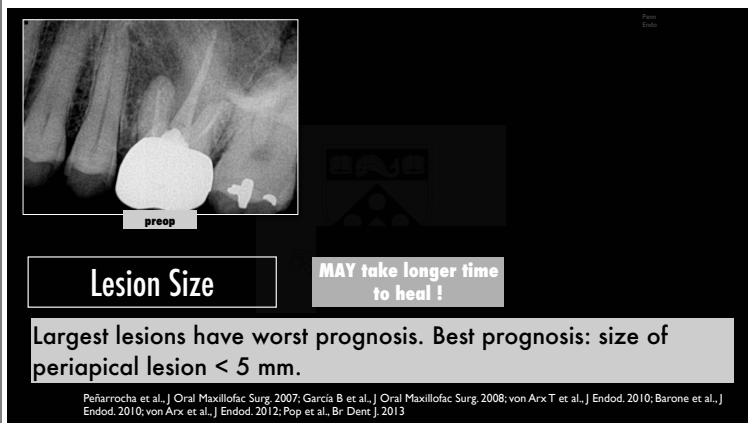
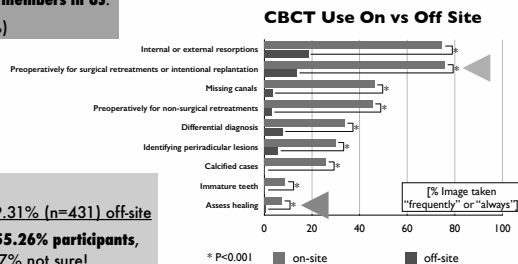
Chafic Safi, Master's Thesis, Penn 2015

A Survey of Cone-beam Computed Tomographic Use among Endodontic Practitioners in the United States

Frank C. Setzer, DMD, PhD, MS,* Nathan Hinckley, DDS,[†] Meetu R. Kohli, BS, DMD,* and Bekir Karabucak, DMD, MS*

- Usage of CBCT among AAE members in US.
- 1083 respondents (35.2%)

- 80.30% access to CBCT
50.69% (n=443) on-site 49.31% (n=431) off-site
- Limited FOV was used by 55.26% participants,
22.37% larger FOVs, 22.37% not sure!



A Comparison of 2- and 3-dimensional Healing Assessment after Endodontic Surgery Using Cone-beam Computed Tomographic Volumes or Periapical Radiographs

Tom Schloss, DMD, MSc,^{1,2} David Sonntag, DMD, PhD,¹ Meetu R. Kohli, BS, DMD,² and Frank C. Setzer, DMD, PhD, MS³

Introducing a precise method of volumetric analysis for the assessment of healing after endodontic microsurgery. Allowed for comparative evaluation of periapical radiography with three-dimensional CBCT imaging for the exact appraisal and clarification of healing patterns.



2D versus 3D
area (PA) vs volumetric analysis
differences in outcome

PENN 3D Criteria (surgical) (modified)

(1) Complete Healing ABCDE

(2) Limited Healing ABCD

Complete healing can be observed in IMMEDIATE VICINITY of the resected root surface.

(3) Uncertain Healing AB

(4) Unsatisfactory Healing

Success

Failure



Postoperative Heilung nach mikrochirurgischer Versorgung/Beurteilung:
Drei dimensionale Volumetrische Analyse mittels Digitaler Volumetrisierung im Vergleich zum konventionellen Röntgen

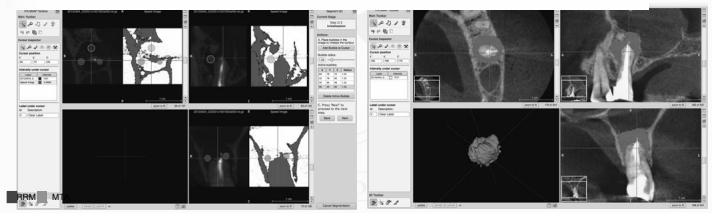
Dr. Tom Schloss

November 2014

Schloss Sonntag Kohli Setzer, JOE 2017

A Comparison of 2- and 3-dimensional Healing Assessment after Endodontic Surgery Using Cone-beam Computed Tomographic Volumes or Periapical Radiographs

Tom Schloss, DMD, MSc,^{1,2} David Sonntag, DMD, PhD,¹ Meetu R. Kohli, BS, DMD,² and Frank C. Setzer, DMD, PhD, MS³



ITK-Snap

Schloss Sonntag Kohli Setzer, JOE 2017

Appraisal and clarification of traditional 2D healing categories "incomplete" or "uncertain" - significant for endodontic outcome assessment and the treatment planning of failed endodontic cases.



"incomplete healing" [2D]



"limited healing" [3D]

Tom Schloss, Nuremberg, Germany

Schloss Sonntag Kohli Setzer, JOE 2017

Reversal of Endodontic Surgery [EMS & RES] ??

Five-Year Longitudinal Assessment of the Prognosis of Apical Microsurgery

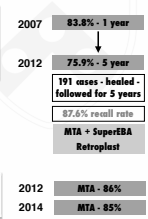
JOE — Volume 38, Number 5, May 2012

Thomas von Arx, DMD,¹ Simon S. Jensen, DDS,² Stefan Hänni, DMD,³ and Shimon Friedman, DMD⁴

The studies. The reviewers suggest a 94% chance to cure post-treatment AP after endodontic microsurgery (6); however, this conclusion is supported exclusively by short-term (1 or 2 years) outcome reports. Considering the 5% to 25% risk of regression to AP reported beyond 3 or more years after apical surgery (7–12), the short-term data supporting the current systematic review's conclusions (6) may overestimate the long-term prognosis of endodontic microsurgery (4).

In the present study, ProRoot MTA-treated teeth showed the least regression at 5 years (just under 4%), suggesting the most effective seal over the longer observation period. Of the teeth treated with

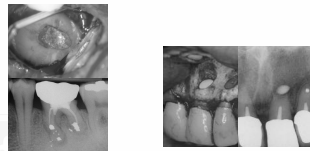
7. Hake A, Mahven O, Grung B. Follow-up after periapical surgery: the value of the one-year control. *Endod Dent Traumatol* 1991;7:246–50.
8. Jessen P, Zetterqvist L, Heindahl A. Long-term results of amalgam versus glass ionomer cement as apical sealant after apicoectomy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1995;79:101–3.
9. Kvist T, Reit C. Results of endodontic retreatment: a randomized clinical study comparing surgical and nonsurgical procedures. *J Endod* 1999;25:814–7.
10. Rubenstein RA, Kim S. Long-term follow-up of cases considered healed one year after apical microsurgery. *J Endod* 2002;28:378–83.
11. Wessan CM, Gale TM. Molar apicoectomy with amalgam root-end filling: results of a prospective study in two district general hospitals. *Br Dent J* 2003;195:707–14.
12. Yazdi PM, Schou S, Jensen SS, Stoltze K, Kanoy R, Sewerin I. Dentine-bonded resin composite (Retaplast) for root-end filling: a prospective clinical and radiographic study with a mean follow-up period of 8 years. *Int Endod J* 2007;40:493–503.



2012 83.8% - 1 year
2012 75.9% - 5 year
191 cases - healed - followed for 5 years
87.6% recall rate
MTA + SuperEBA
Retaplast
2012 MTA - 86%
2014 MTA - 85%

von Arx T et al. J Endod. 2012
von Arx T et al. J Endod. 2014

Significant reversal with old or alternative techniques !!



Material	No or GP root-end filling	Amalgam	Retroplast
Studies	Kvist & Reit, J Endod 1999	Jessen et al., OOOO 1995	Yazdi et al., Int Endod J 2007
	60% (4yr)	49% (5yr)	78% (>5yr)
	Kruse et al., J Endod 2016	Wessan & Gale, Br Dent J 2003	Jensen et al., Clin Oral Investg 2002
	55% (6yr)	57% (5yr)	73% (4yr)
			von Arx et al. J Endod. 2012
			84.7% (1yr) - 75.3% (5yr)

7. Hake A, Mahven O, Grung B. Follow-up after periapical surgery: the value of the one-year control. *Endod Dent Traumatol* 1991;7:246–50.
8. Jessen P, Zetterqvist L, Heindahl A. Long-term results of amalgam versus glass ionomer cement as apical sealant after apicoectomy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1995;79:101–3.
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Reversal with microsurgical techniques ??

TABLE 4. Distribution of the Failed Cases at the Long-term Follow-up

Tooth number	Root-end filling material	1-year follow-up evaluation	Long-term follow-up evaluation	Intervention	Cause of failure
4	#12	MTA	Uncertain	None	Unknown
5	#12	MTA	Unsatisfactory	None	Unknown
6	#12	MTA	Unsatisfactory	—	Endo
7	#12	MTA	Unsatisfactory	—	Endo
8	#12	MTA	Unsatisfactory	—	Endo
9	#12	MTA	Unsatisfactory	—	Endo
10	#12	MTA	Unsatisfactory	—	Endo
11	#12	MTA	Unsatisfactory	—	Endo
12	#12	MTA	Unsatisfactory	—	Endo
13	#12	MTA	Unsatisfactory	—	Endo
14	#12	MTA	Unsatisfactory	—	Endo
15	#12	MTA	Unsatisfactory	—	Endo
16	#12	MTA	Unsatisfactory	—	Endo
17	#12	MTA	Unsatisfactory	—	Endo
18	#12	MTA	Unsatisfactory	—	Endo
19	#12	MTA	Unsatisfactory	—	Endo
20	#12	MTA	Unsatisfactory	—	Endo

Comparison of Clinical Outcomes of Endodontic Microsurgery: 1 Year versus Long-term Follow-up

Mingyi Song, DDS, MSD, PhD,¹ Timothy Nam, DDS, MSD,² Su-Jung Shin, DDS, MS, PhD,³ and Esteban Kim, DDS, MSD, PhD⁴

Total 14/115 cases failed

3 cases with "uncertain healing" had healed at >4 year follow-up

follow-up of 4-8 years

	Success Rate	f/u Rate
1 year	91.3%	105/115
>4 year	87.8%	101/115

statistically not significant
p=0.344

5/7 cases that were classified as healed at 1-year follow-up had failed at >4 year follow-up due to prosthodontics reasons

Long-term Outcome of the Cases Classified as Successes Based on Short-term Follow-up in Endodontic Microsurgery

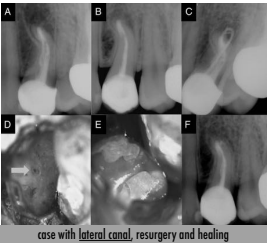
Minju Song, DDS, MSD, Woncho Chung, DDS, MSD, Seungjong Lee, DDS, MSD, PhD, and Euisong Kim, DDS, MSD, PhD

7 cases failed

TABLE 4. Distribution of the Failed Cases					
Case	Lesion type	Short-term follow-up outcome	Evaluation at long-term follow-up	Resurgery	Cause of failure
(a)	Endo	Incomplete	Lesion size increase	Yes	Crack
(b)	Endo	Incomplete	Sinus tract(s)	Yes	Lateral canal
(c), (d), and (e)	Endo	Incomplete	Sinus tract(s)	Yes	Leakage around the root and filling material
(f)	Endo	Complete	Sinus tract(s)	No	Unknown
(g)	Endo + perio	Incomplete	Lesion size increase	No	Unknown

91.5% - success over period of 2-5 years 172 cases - healed
93.3%/ 91.5% success at 6-10 years f/u 104 cases f/u

A second surgery was carried out after finding of failure



case with lateral canal, resurgery and healing

Long-term Outcome of the Cases Classified as Successes Based on Short-term Follow-up in Endodontic Microsurgery

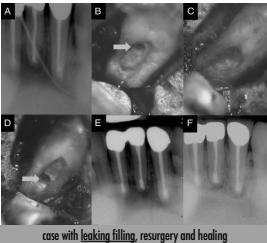
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91.5% - success over period of 2-5 years 172 cases - healed
93.3%/ 91.5% success at 6-10 years f/u 104 cases f/u

A second surgery was carried out after finding of failure



case with leaking filling, resurgery and healing

Micro-Resurgery

Outcomes of Endodontic Micro-resurgery:
A Prospective Clinical Study

Minju Song, DDS, MSD, Su-Jung Shin, DDS, MS, and Euisong Kim, DDS, MSD, PhD

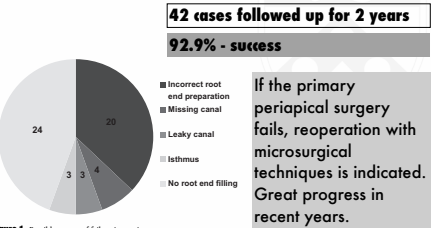


Figure 1. Possible causes of failure in previous surgery.



case with misplaced root-end filling

Song et al., J Endod. 2011

Length of Root Filling

Yes

Short or inadequate root fillings may contain the source of infection. Removal and/or treatment of unfilled root portions or extruded material can provide good results for apical surgery.

Barone et al., J Endod. 2010; Song et al., J Endod 2011

Root-End Filling



3+3 mm minimum rule

Frank Setzer, Phila, PA

Case Report/Clinical Techniques Treatment Protocols

Conventional and Surgical Retreatment of Complex Periradicular Lesions With Periodontal Involvement

Bekir Karabucak, DMD, MS, and Frank C. Setzer, DDS, MS, PhD



Root-end filling

GTR treatment

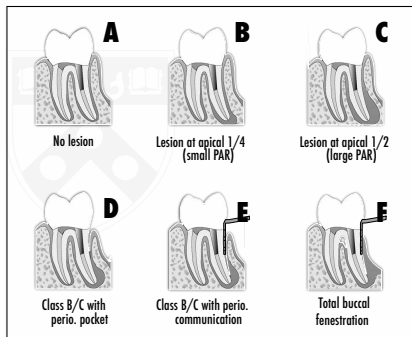
1-year follow-up

Karabucak & Setzer, J Endod. 2009

Microsurgery Case Classification

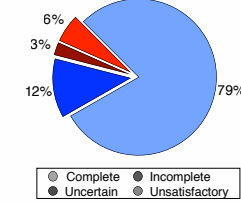
[A B C]
Endodontic Lesions

[D E F]
Periodontal Involvement

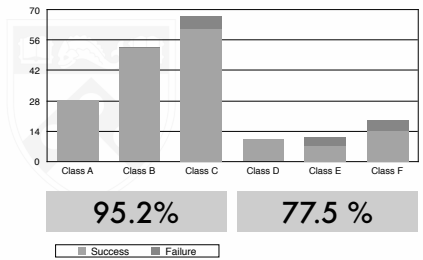


Kim & Kratchman, JOE, 2010

Endo-Perio



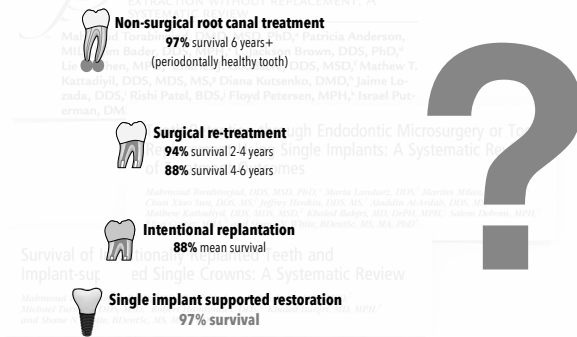
n=263, microsurgery



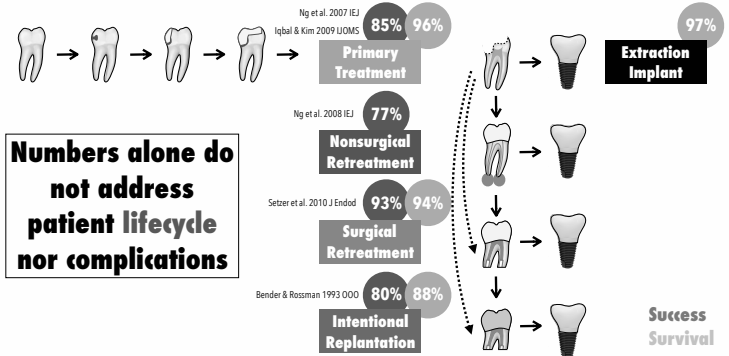
Case selection is key !!

Kim E et al., JOE, 2008

Tooth vs. Implant Survival – Meta-analyses

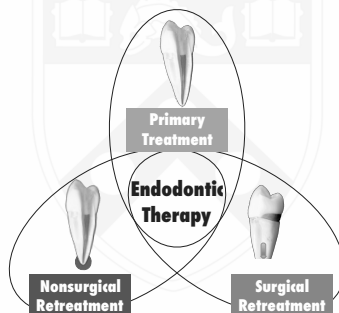


The predictable life of a tooth ?



Numbers alone do not address patient lifecycle nor complications

Why Surgery? - Penn Endo Philosophy



Dr. Syngcuk Kim

Are Dental Implants a Panacea or Should We Better Strive to Save teeth?

Giannobile, W.V. and Lang, N.P.



"The erroneous belief of implants yielding a better long-term prognosis has now clearly been rejected in several comparative studies...."

"....re-visit the long history of success of tooth maintenance to preserve the natural dentition..."

EDITORIAL: J. Dent Res vol 95(1)5-6, 2016



Penn Endodontics "Penn Endo"

1947-2017 70 years

fsetzer@upenn.edu