

Minimally invasive transcrestal Sinus Floor Elevation

Benno Syfrig

Med Dr (U Zurich) and Dentist (U Basel)

Fellow and Director of

ITI International Team for Implantology

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Hippocrates, 2500 years ago: "nihil nocere»

Darwin, almost 200 years ago: "that every organism multiplied, if the natural conditions are good»

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Hippocrates, 2500 years ago: "nihil nocere»

Darwin, almost 200 years ago: "that every organism multiplied, if the natural conditions are good»

Minimally invasive operating means: throughout the surgery
beware
the "natural conditions" don't damage

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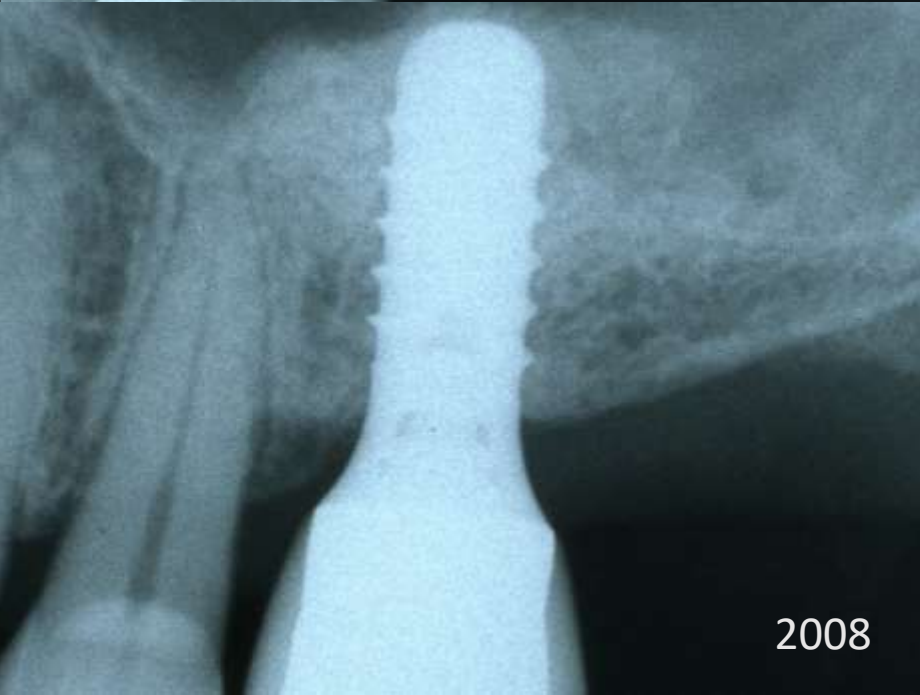
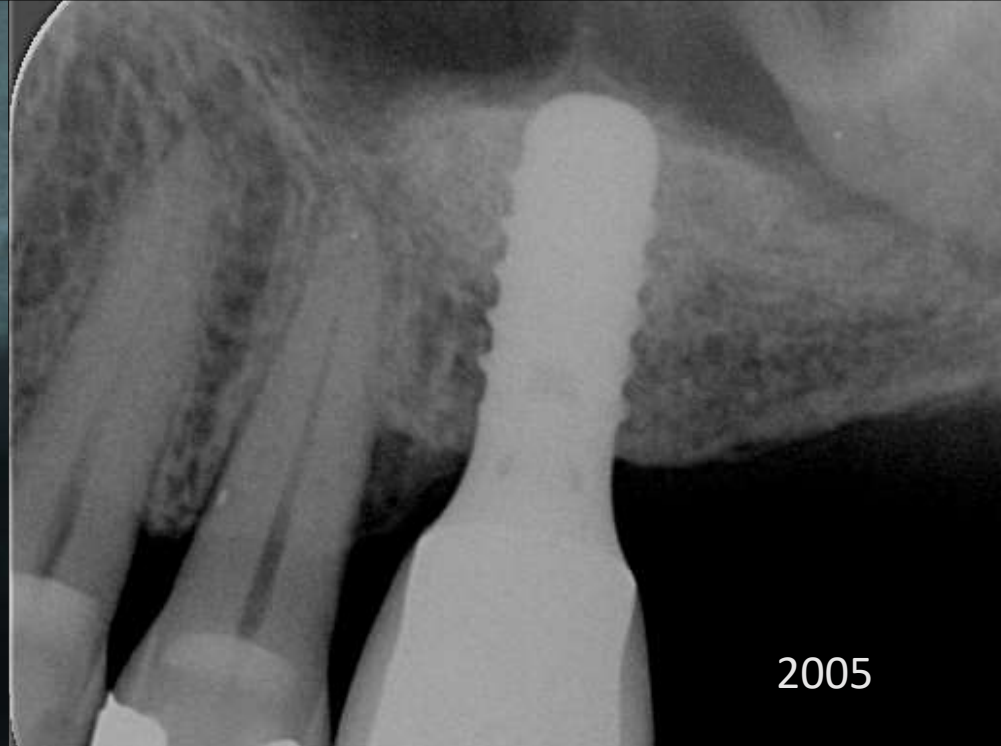
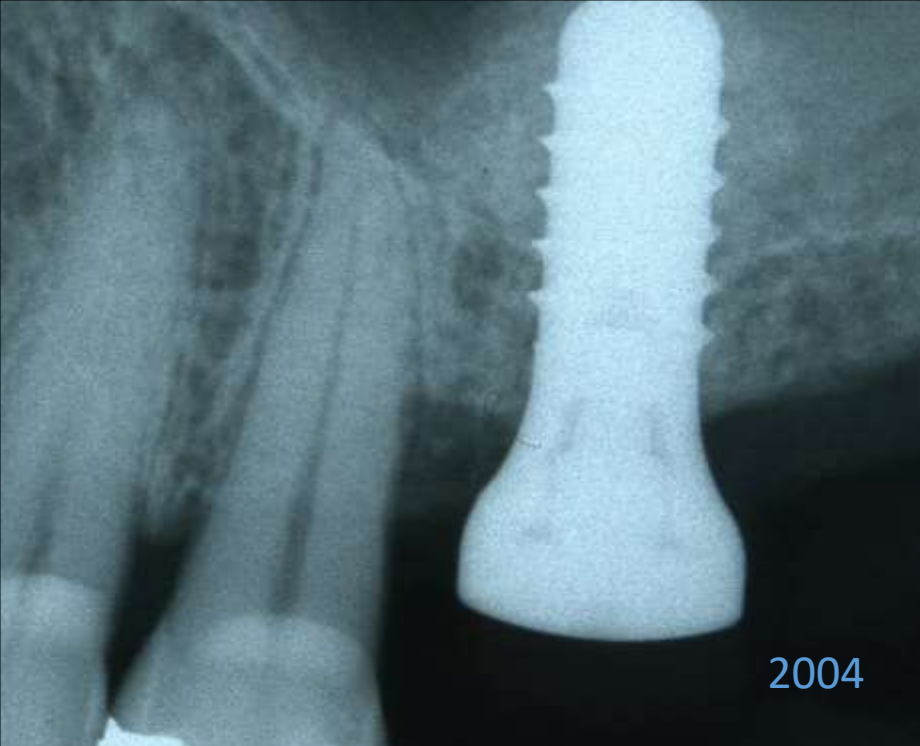
*... Be aware of the natural conditions
as little as possible damage*

...



L.M. 01.12.2004





Minimally invasive transcrestal Sinus Floor Elevation

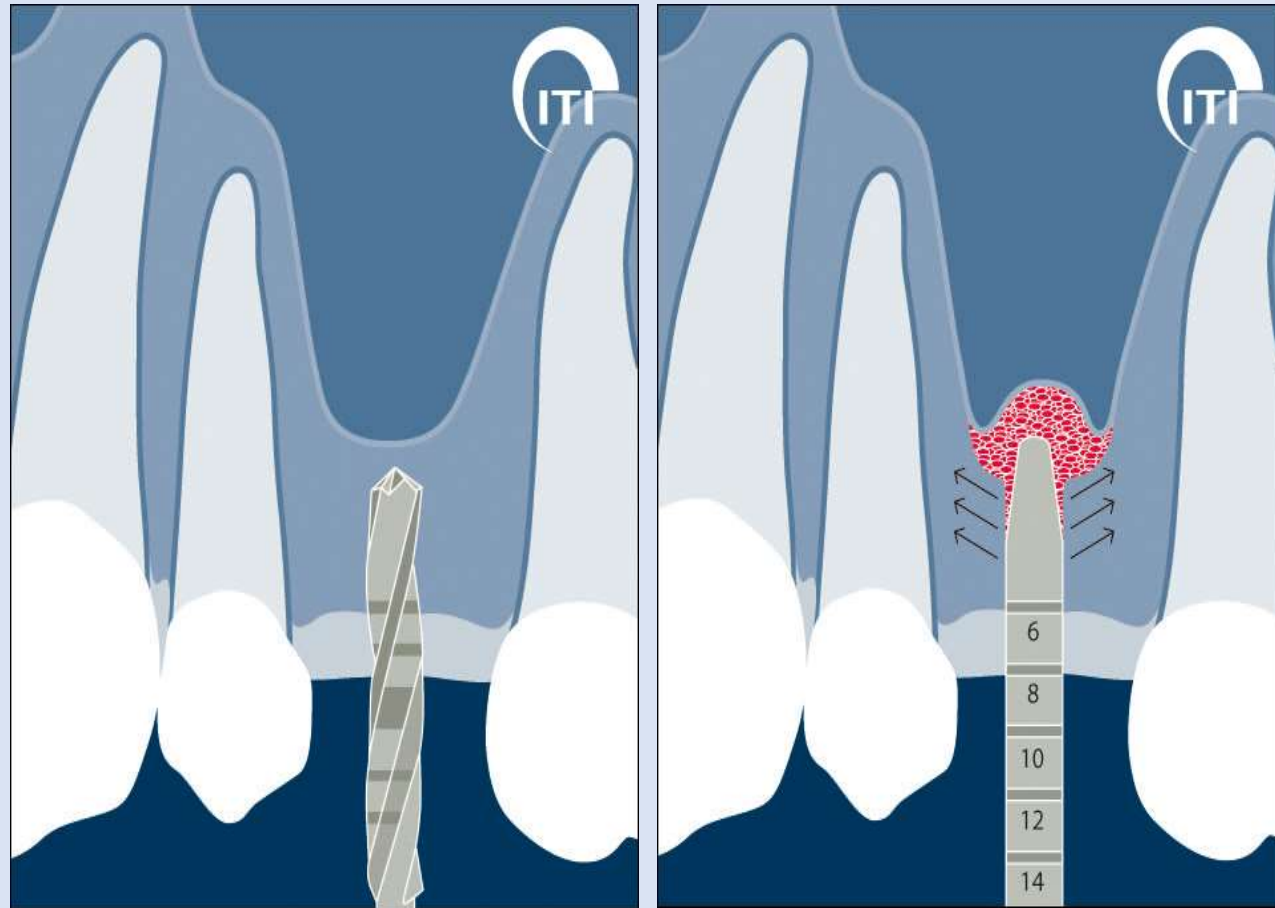
- from the window technique: the opening of the sinus floor and the elevation of the sinus membrane

Minimally invasive transcrestal Sinus Floor Elevation

- from the window technique: the opening the sinus floor and the elevation of the sinus membrane
- from the summerstechnique: the crestally access

Surgical technique – Transcrestal technique

The membrane is elevated by introducing the grafting material using an osteotome with a convex tip

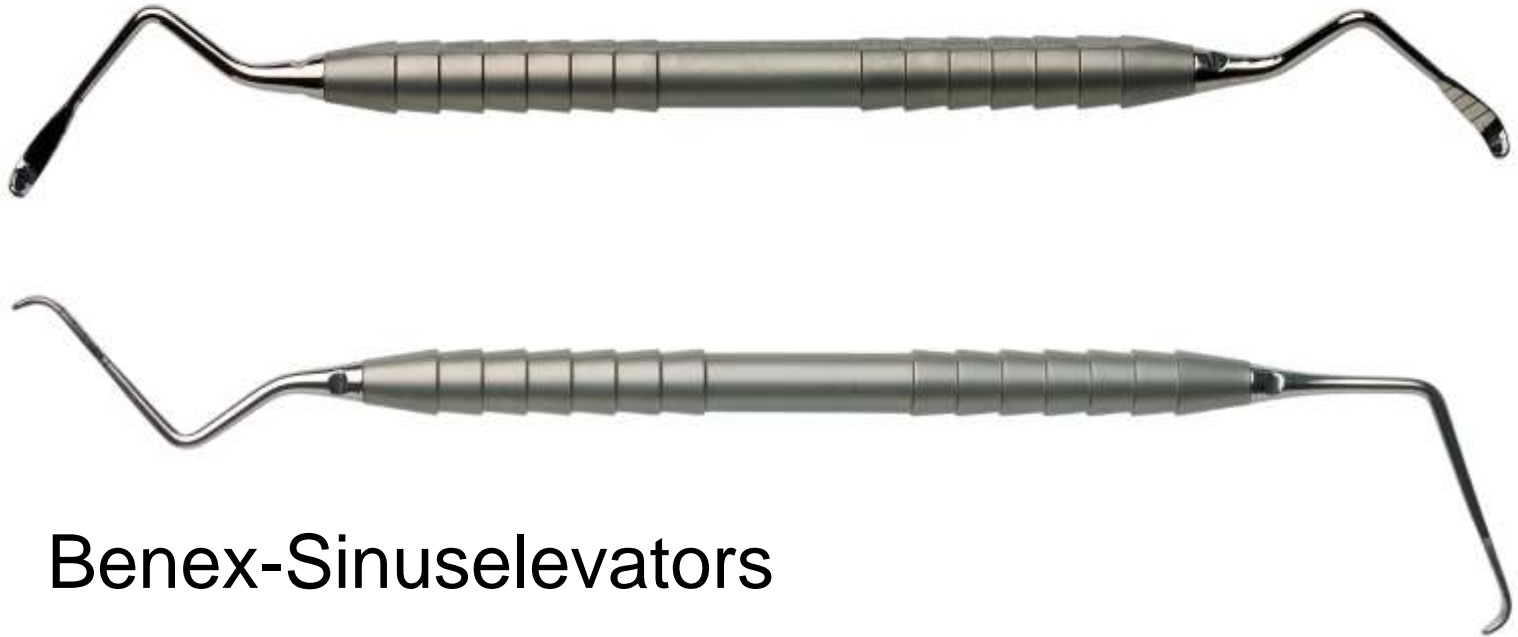


Minimally invasive transcrestal Sinus Floor Elevation

- from the window technique: the opening the sinus floor and the elevation of the sinus membrane
- from the summerstechnique: the crestally access
- simultaneously with every subantral bone height

Minimally invasive transcrestal Sinus Floor Elevation

- from the window technique: the opening the sinus floor and the elevation of the sinus membrane
- from the summerstechnique: the crestally access
- simultaneously with every subantral bone height
- exogenous bone substitute (bioOss) without autologous bone



Benex-Sinuselevators

and

0,25 g xenogenes bone substitue
(BioOss-Granulat 0.25mm – 1mm)

Minimally invasive

from the extraction to the wound closure

The approach with the Benex elevators

Extraction

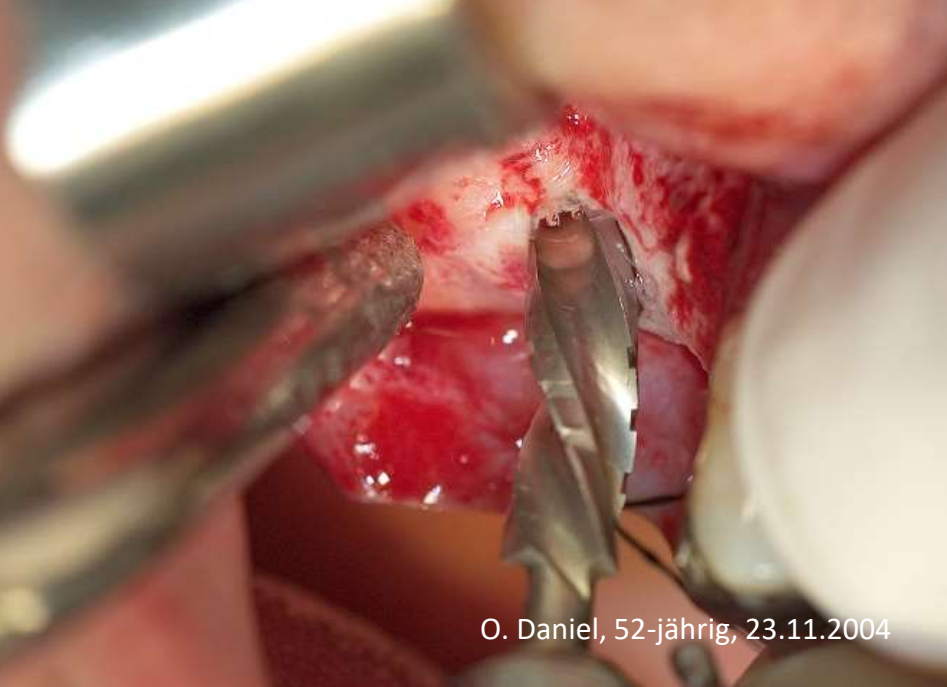
Soft tissue management

Tips und Tricks

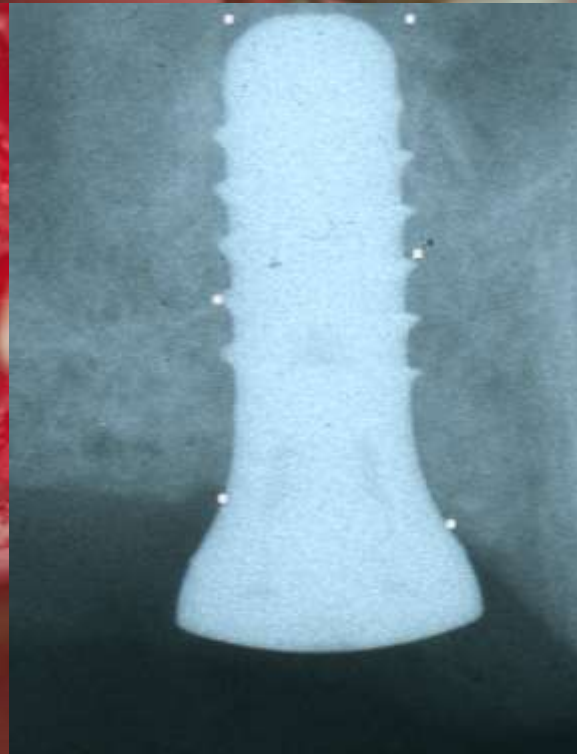
Specialities: Sinus sept
 buccocrestal defect
 little subantral bone height

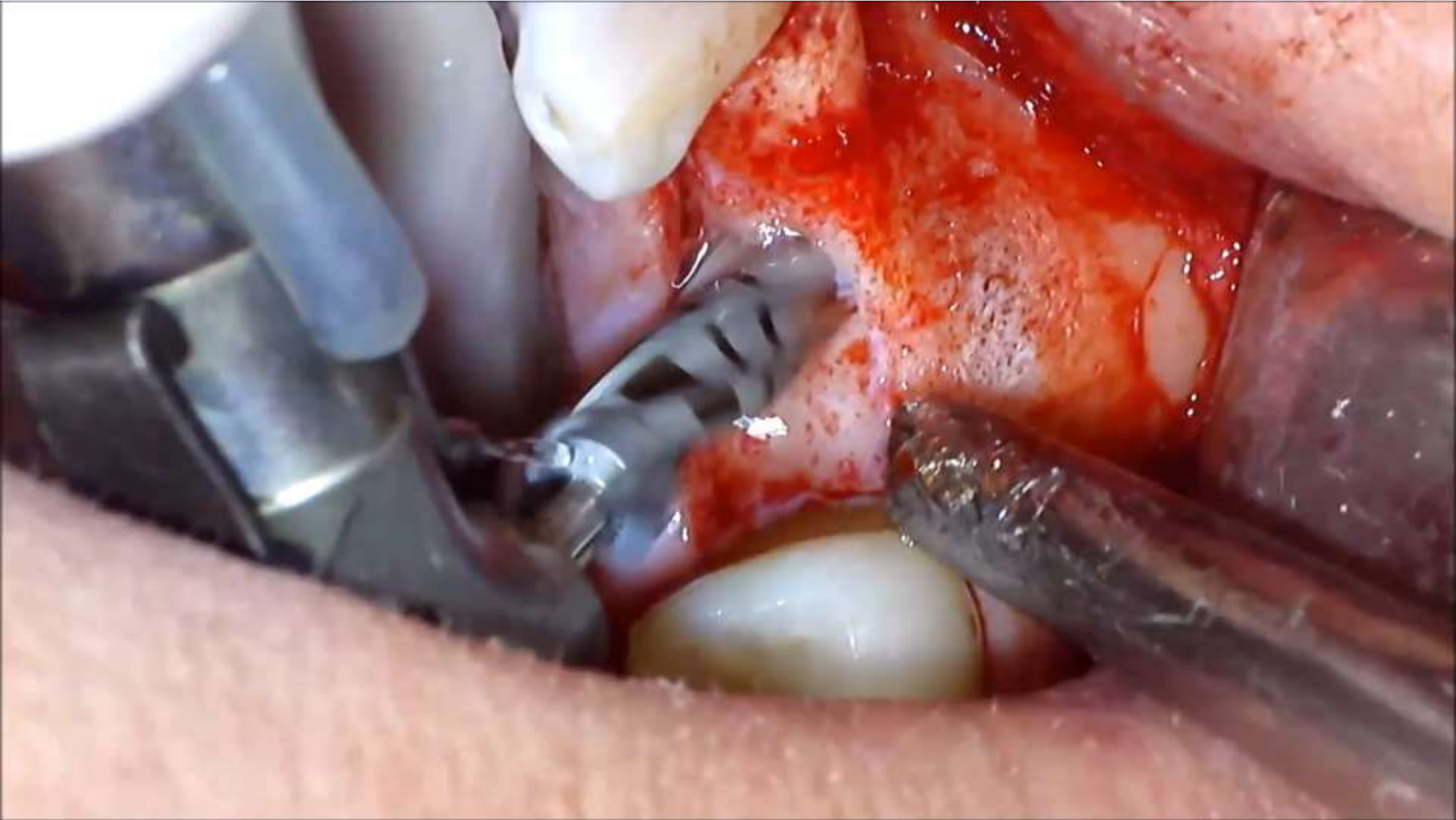
Ossification / Remodelling of the augmented Sinus

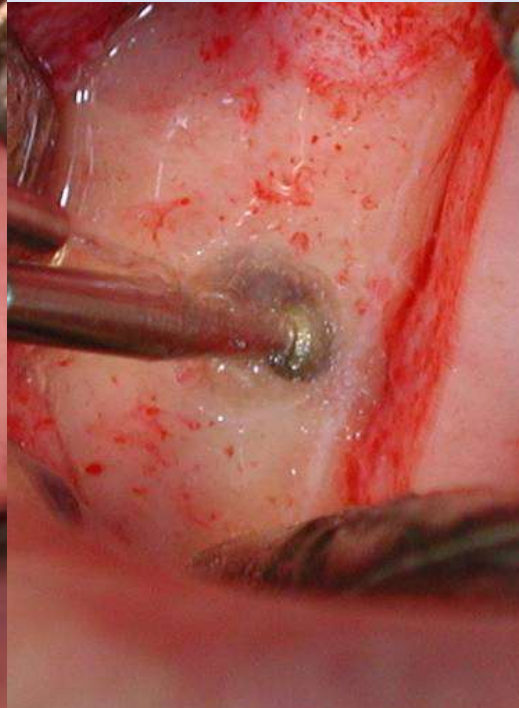
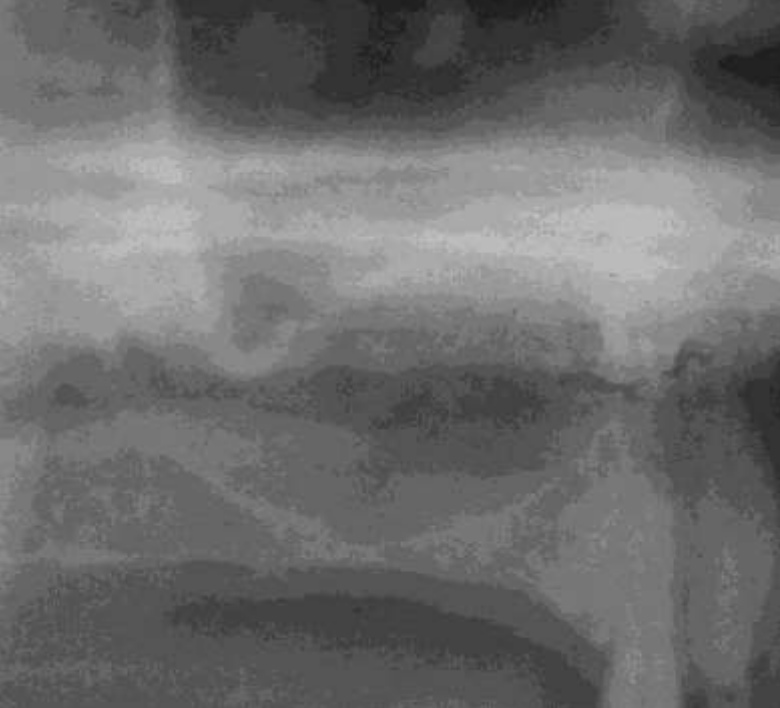
Suprastructure

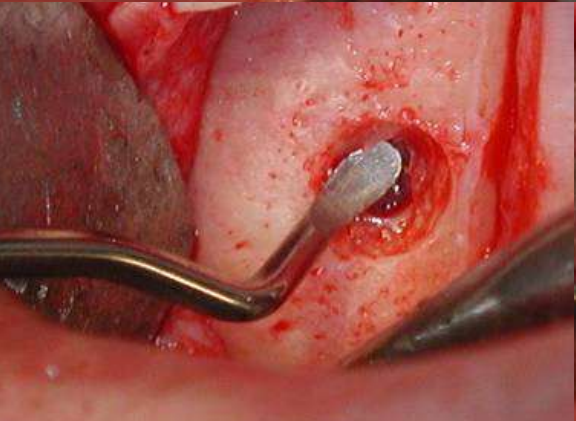
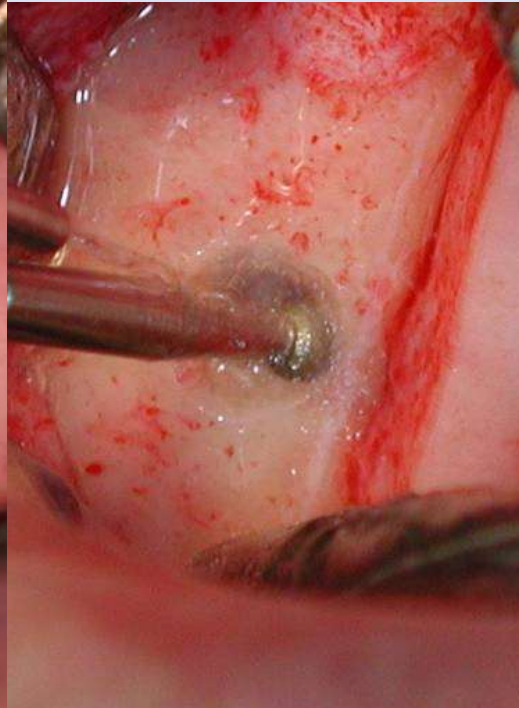


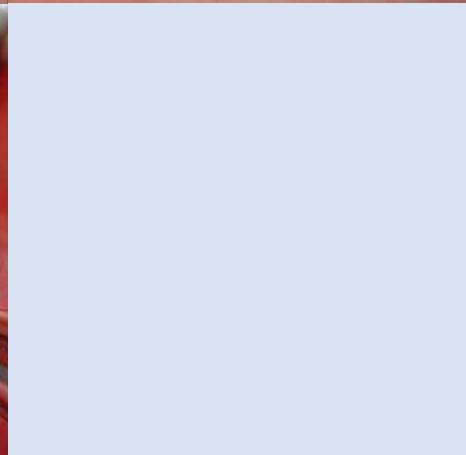
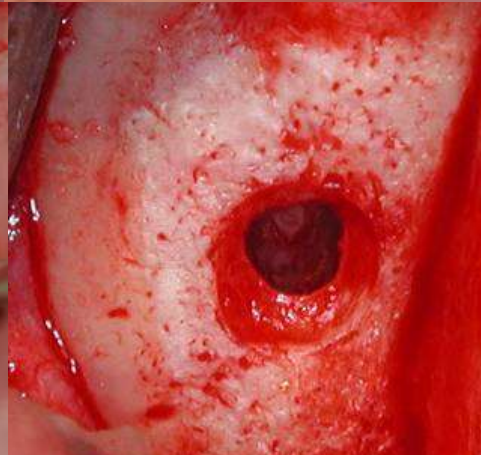
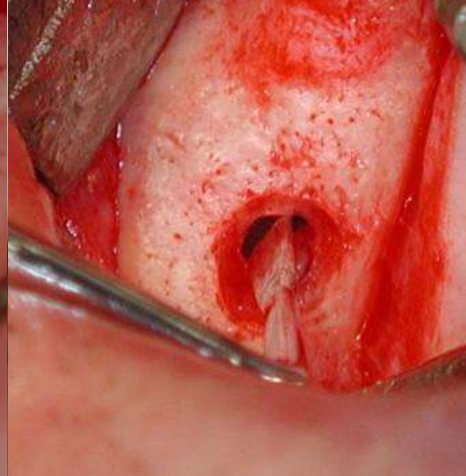
O. Daniel, 52-jährig, 23.11.2004

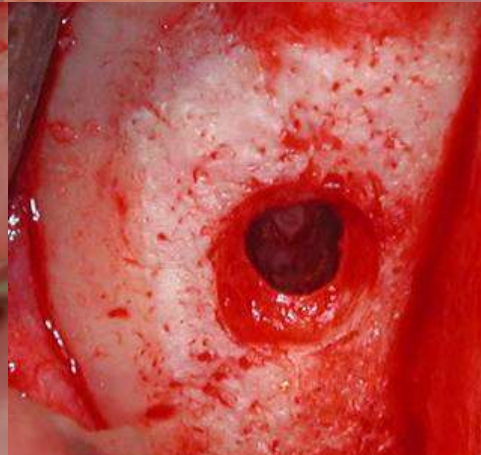
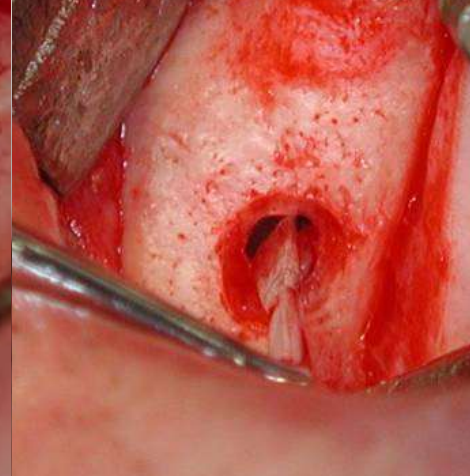




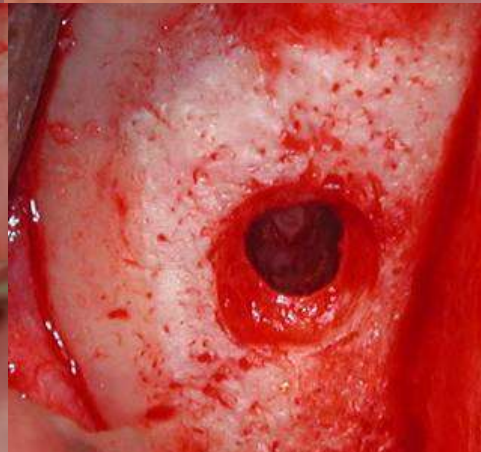
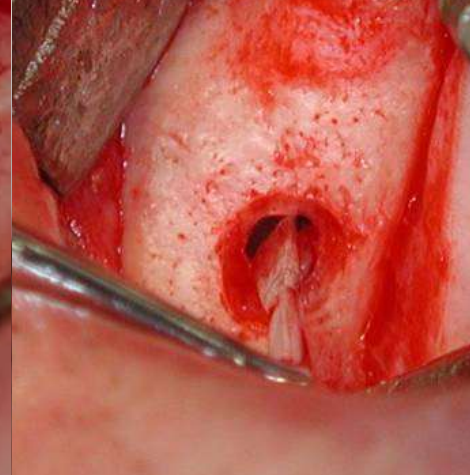


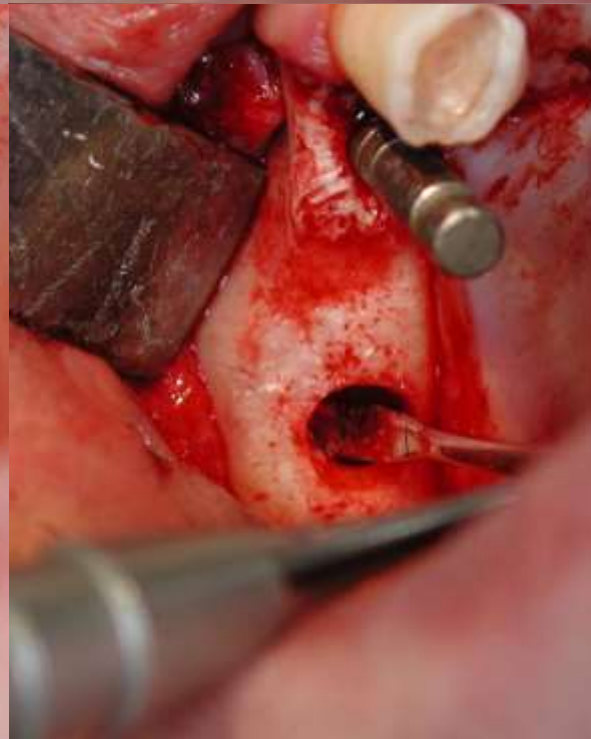
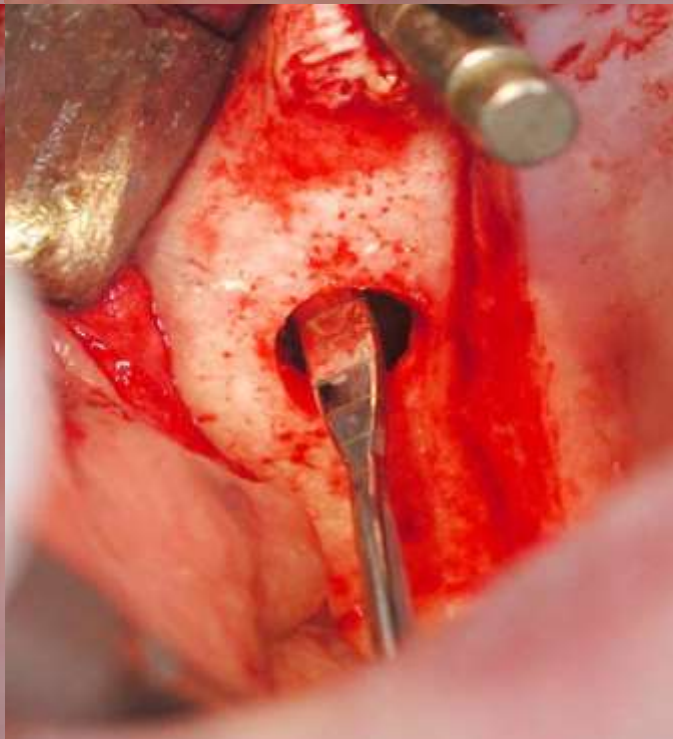
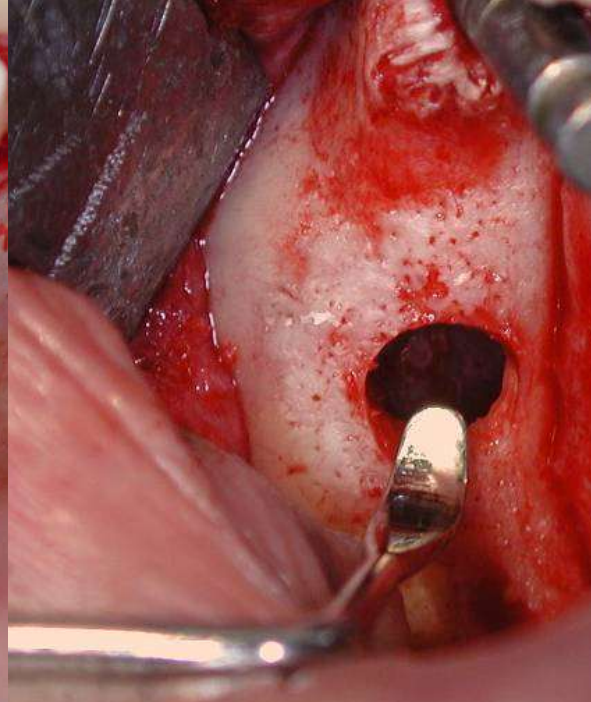
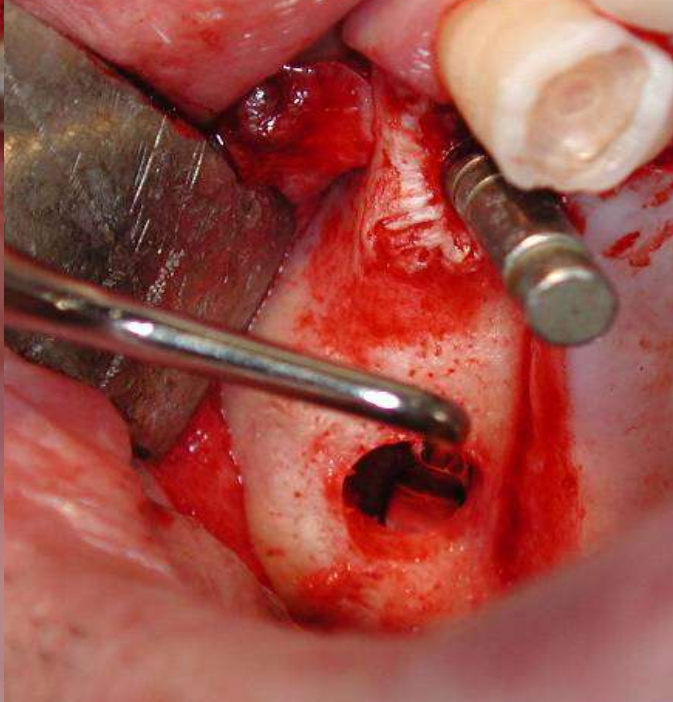
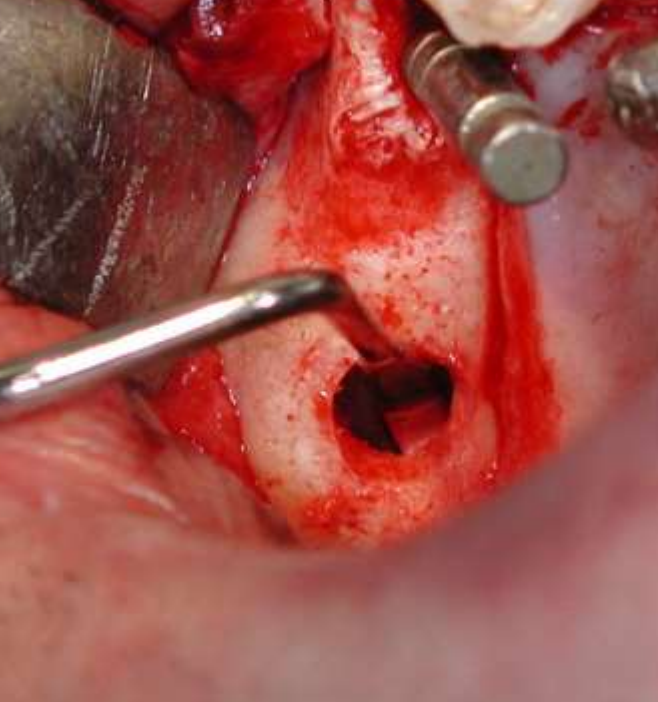


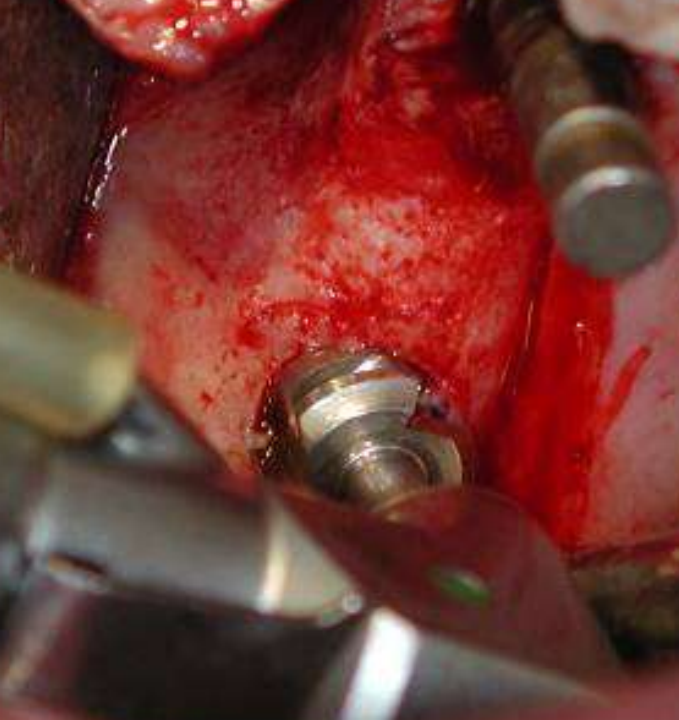


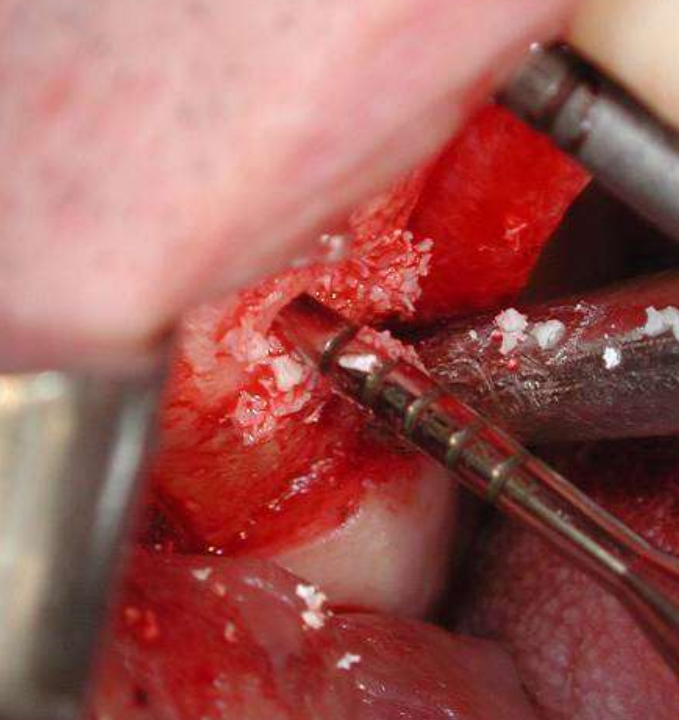
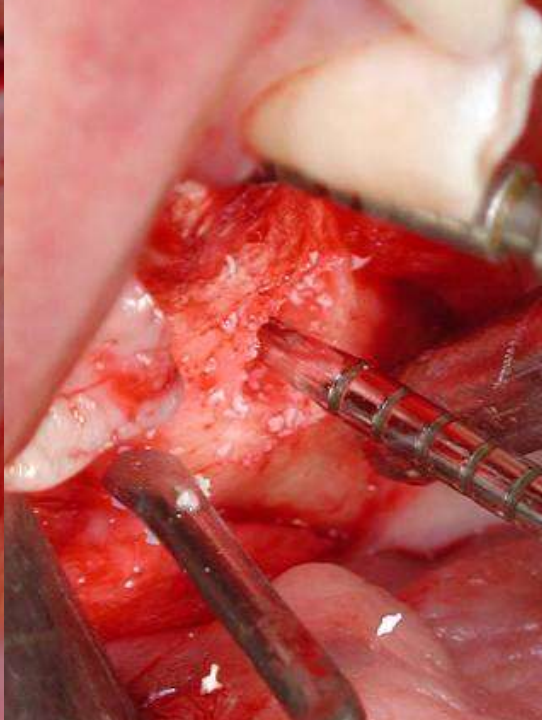
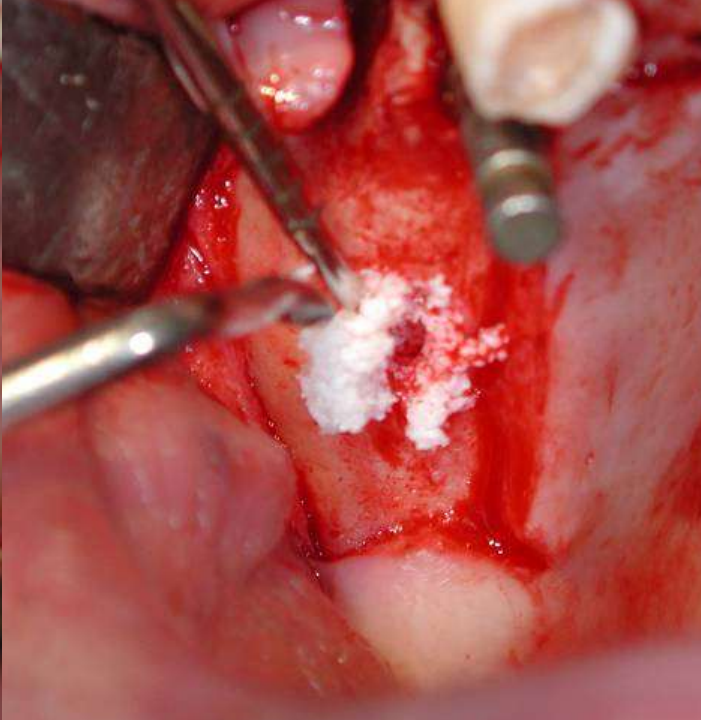
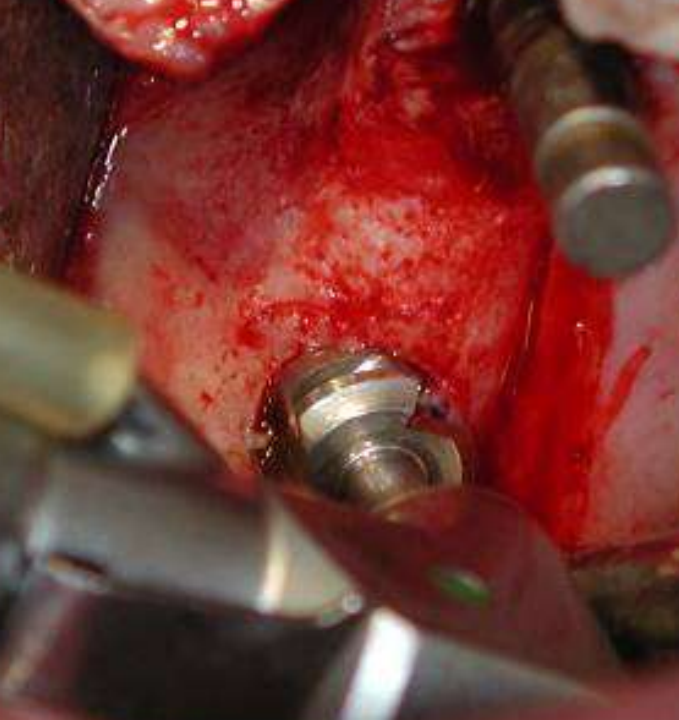


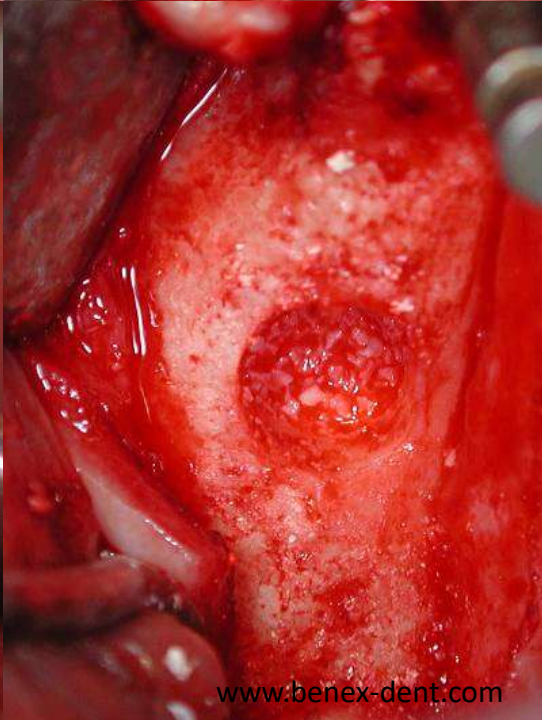
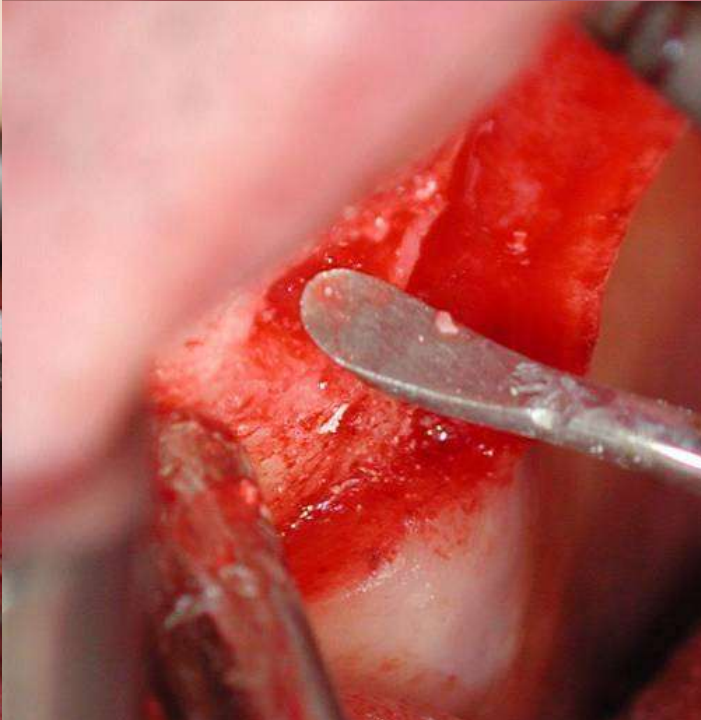
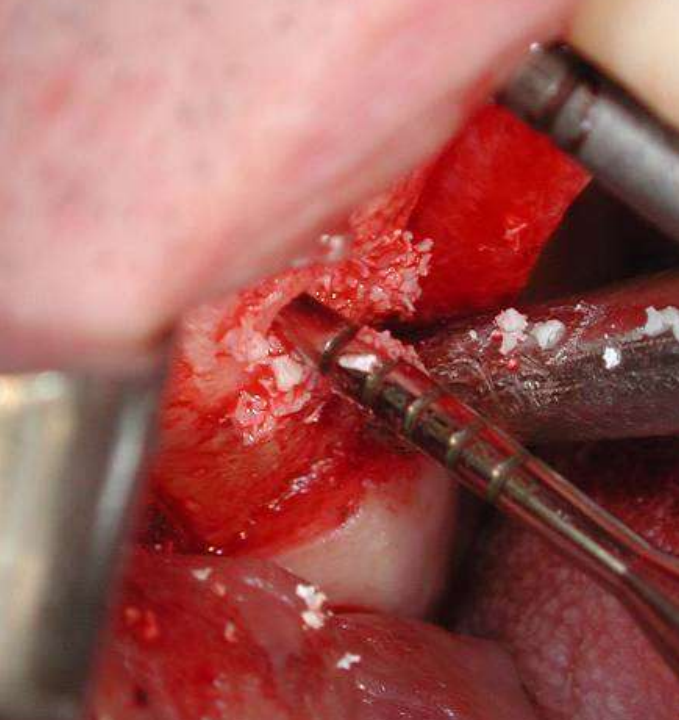
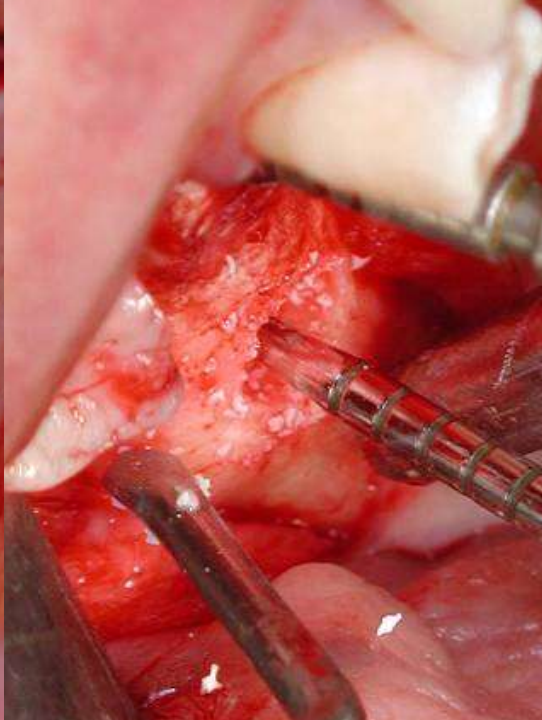
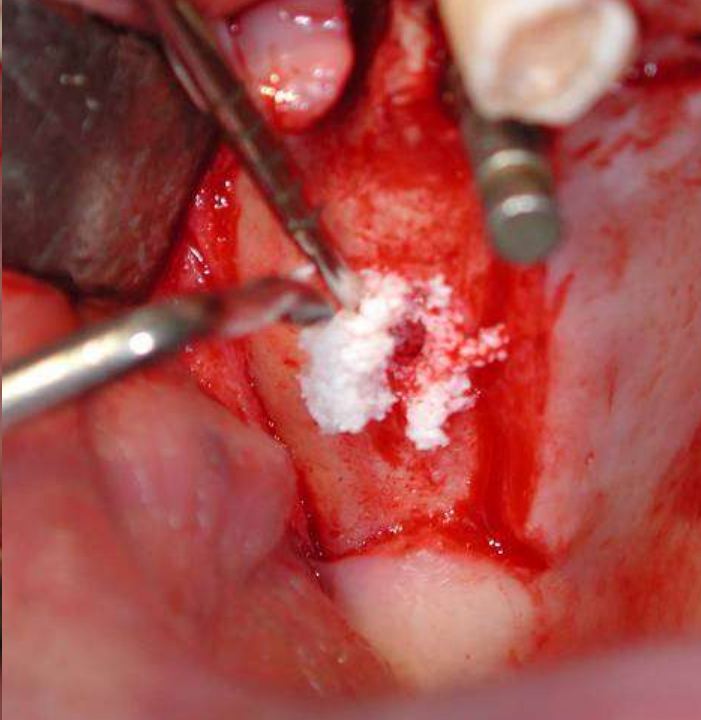
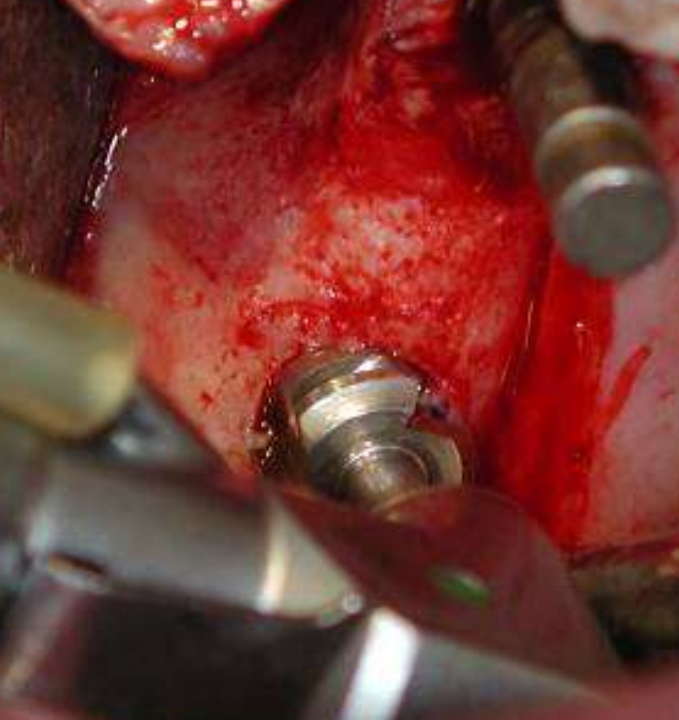


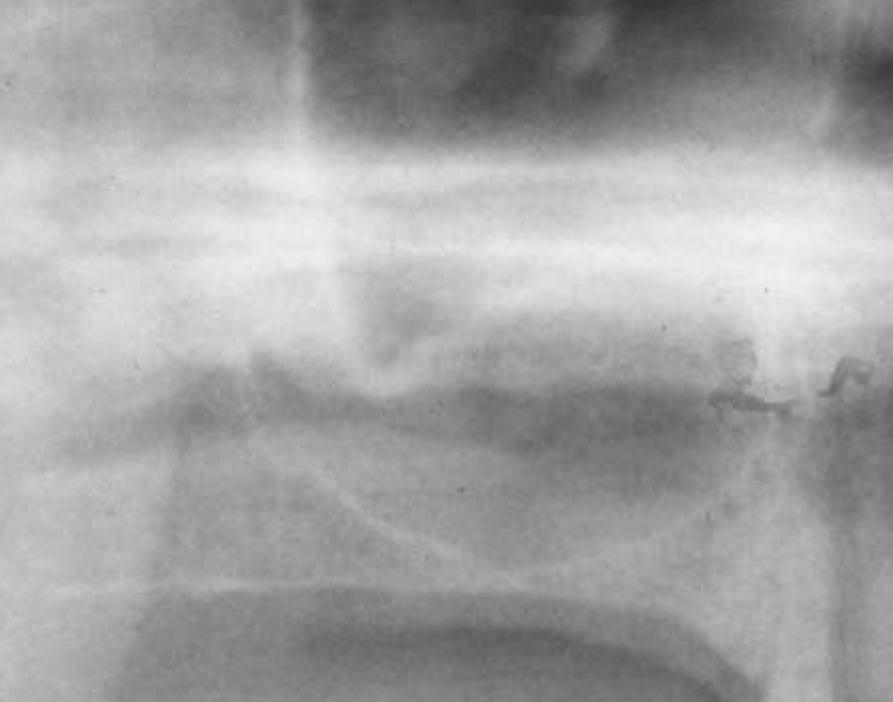












Postop: immediately...



ten days...



three months...

three years postoperative



ten years postoperative



A new technique for minimally invasive sinus floor augmentation:

a single center prospective cohort study on 339 patients
peer reviewed published: ZZI 1/2010

- All implants from Benno Syfrig with sinus mucosa elevation from **January 2001 to July 2006**:

Study end: July 2007. Loading time 1 to 6 ½ years.

No contraindications such as nicotine consumption, status after sinusitis etc.

- Number of implants: 560

42 with buccal fenestration (window technique)

97 Summers technique (bicortical implantation)

421 Implantations transcrestal with the Benex Sinuselevators

- for the first two groups (139 implants): only losses were recorded :

2 with Window technique

0 with Summers technique.

- Detailed, statistical evaluation of 419 transcrestal implantations

(In 2 cases the implants are osseointegrated, but because of patient delay not loaded at the study end date)

	Zahn- lokalisation	Absolute Häufigkeit			%		
		ja	nein	Total	ja	nein	Total
Implantat- Verlust	Molar	3	266	269	1.1	98.9	100
	Prämolar	2	148	150	1.3	98.7	100
	Total	5	414	419	1.2	98.8	100
					p=0.84		



For my study measurements
I took the post-op x-ray.

With the distance between two
reference points on the implants
I could precisely calculate the real length
of the bone height and the sinus
elevation

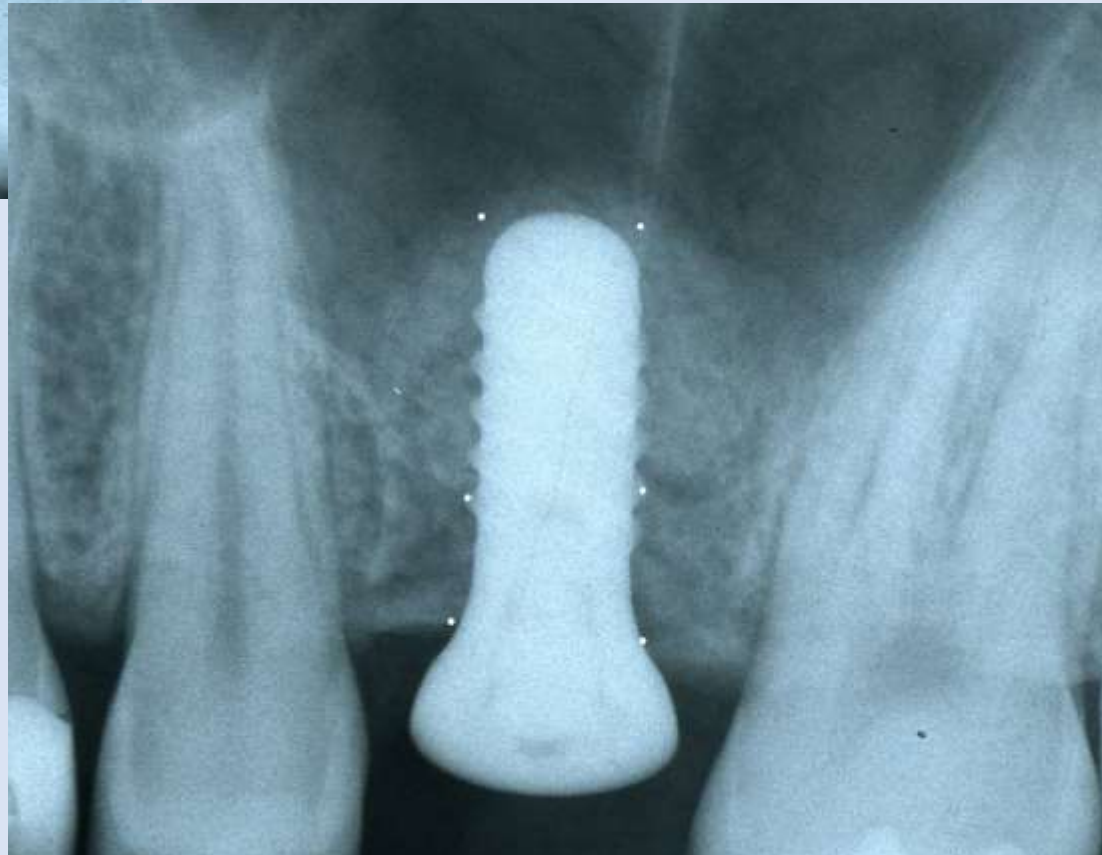
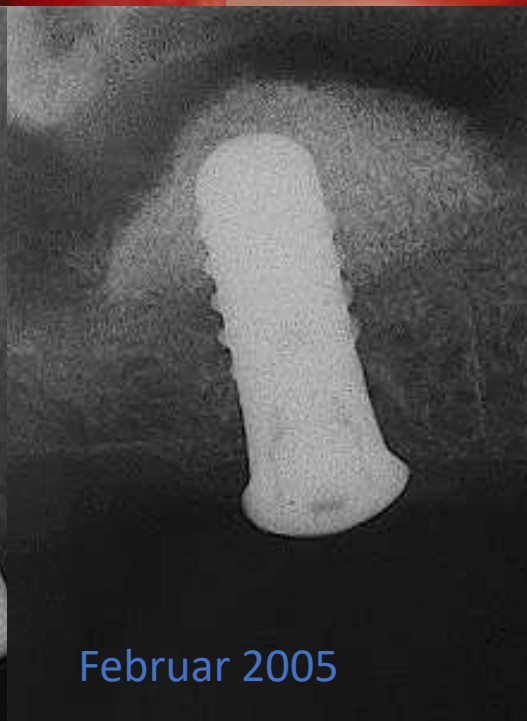
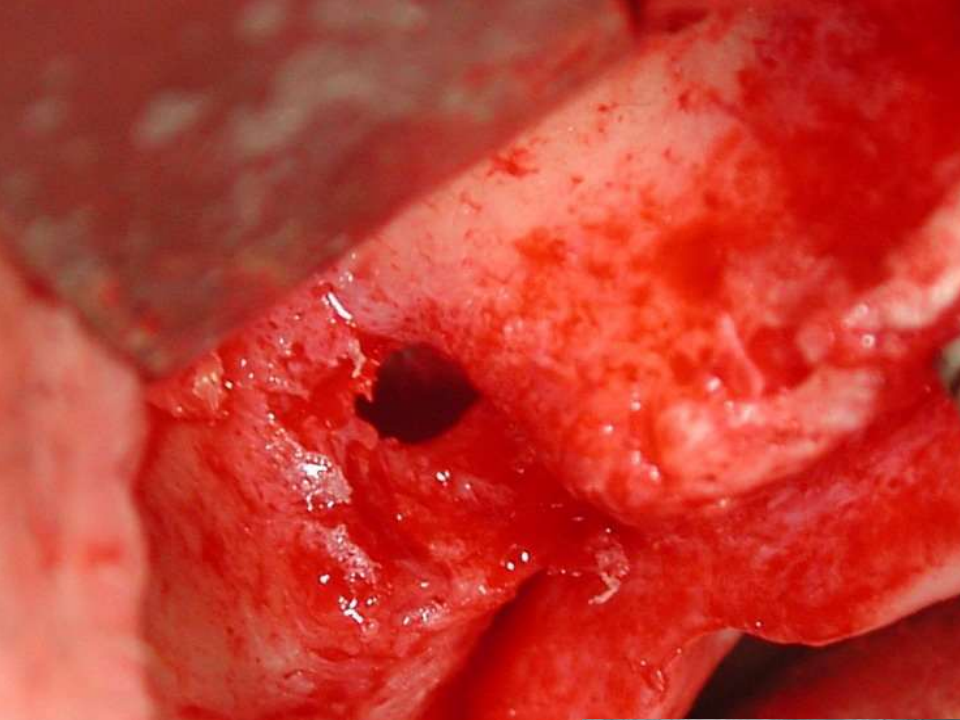


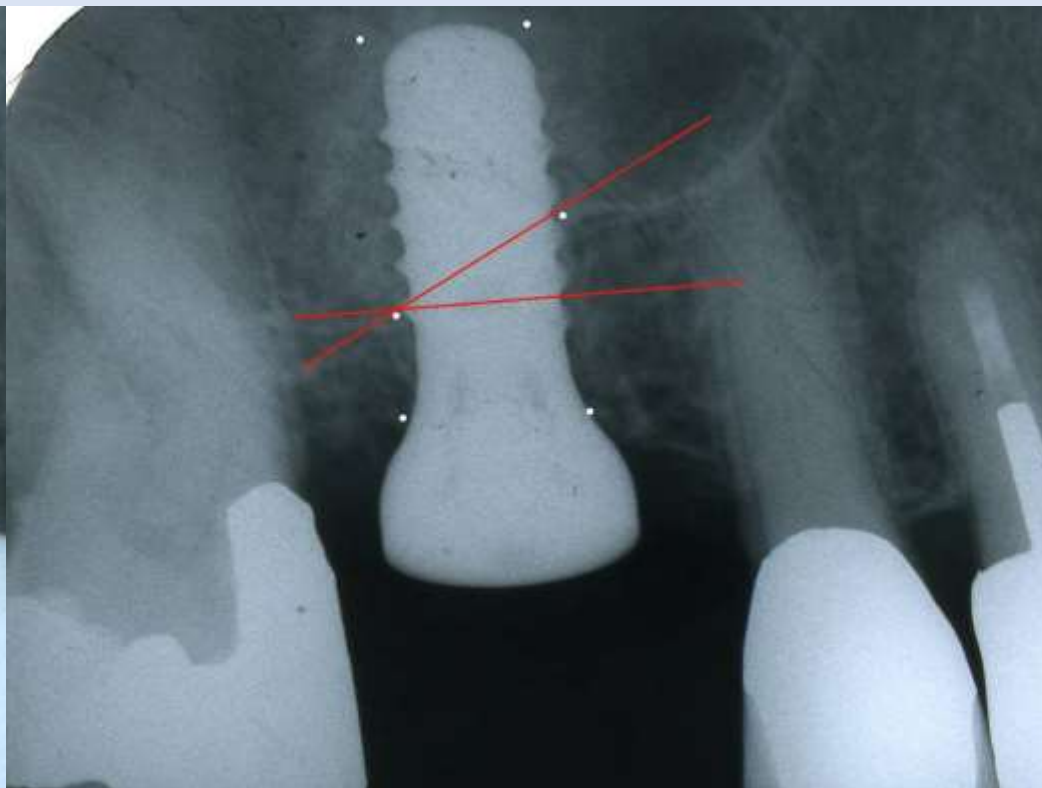
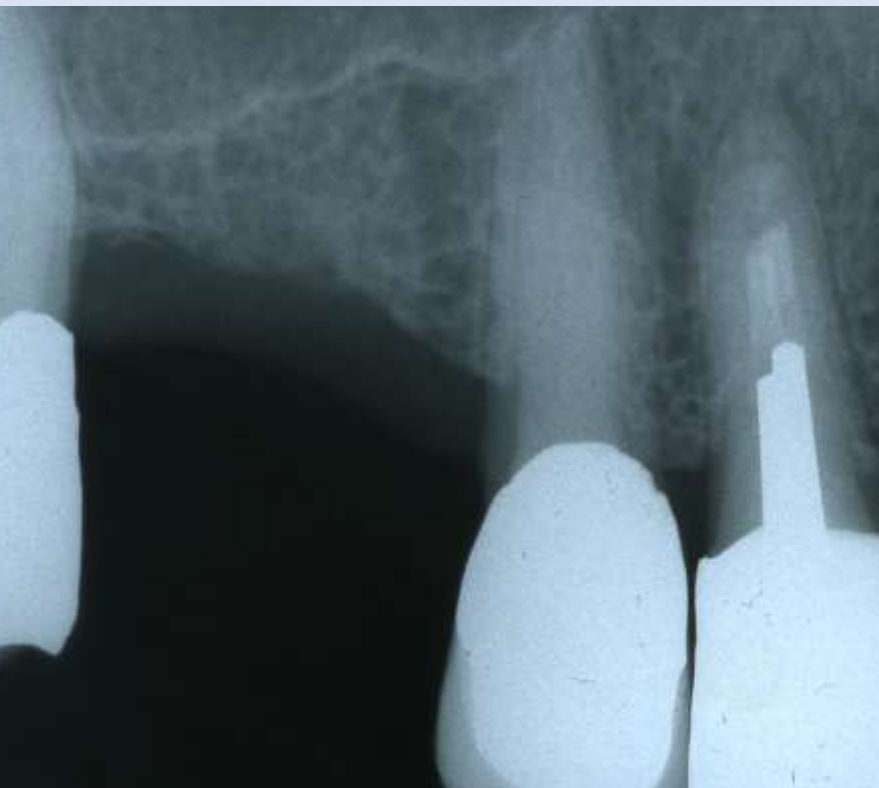
Tabelle 10:
Umfang n, Mittelwert m, Standardabweichung s und 95% Konfidenzintervall für Restknochenhöhen und Implantatlängen der Implantatgruppen nach Zahnlokalisierung (8 Eckzahnfälle bei Prämolarenfällen zugeordnet)

Variable	Sub- gruppe	Statistik			
		n	m	s	±95%CI
Minimale Restknochenhöhe [mm]	Molar	269	4.73	1.93	0.23
	Prämolar	150	5.98	2.02	0.33
	Total	419	5.18	2.05	0.20
Maximale Restknochenhöhe [mm]	Molar	269	6.15	2.36	0.28
	Prämolar	150	8.31	2.26	0.37
	Total	419	6.92	2.55	0.24
Mittlere Restknochenhöhe [mm]	Molar	269	5.44	2.07	0.25
	Prämolar	150	7.14	2.00	0.32
	Total	419	6.05	2.20	0.21
Kleinste Implantatlänge in Kieferhöhle [mm]	Molar	269	5.04	2.06	0.25
	Prämolar	150	3.54	1.66	0.27
	Total	419	4.50	2.05	0.20
Grösste Implantatlänge in Kieferhöhle [mm]	Molar	269	6.20	1.91	0.23
	Prämolar	150	5.45	1.73	0.28
	Total	419	5.93	1.88	0.18
Mittlere Implantatlänge in Kieferhöhle [mm]	Molar	269	5.62	1.93	0.23
	Prämolar	150	4.50	1.55	0.25
	Total	419	5.22	1.88	0.18

*These values are necessary for comparing with other sinuslift studies.
For the sinuslift method I am about to show you they are irrelevant.*



	Zahn- lokalisierung	Absolute Häufigkeit					%				
		0-5	5-20	20-40	≥40	Total	0-5	5-20	20-40	≥40	Total
Winkel Kiefer- höhleboden	Molar	71	127	67	4	269	26.4	47.2	24.9	1.5	100
	Prämolar	14	53	67	16	150	9.3	35.3	44.7	10.7	100
[Grad]	Total	85	180	134	20	419	20.3	43.0	32.0	4.8	100
							p=0.0000				



Minimally invasive

from the extraction to the wound closure

The approach with the Benex elevators

Extraction

Soft tissue management

Tips und Tricks

Specialities: Sinus sept
 buccocrestal defect
 little subantral bone height

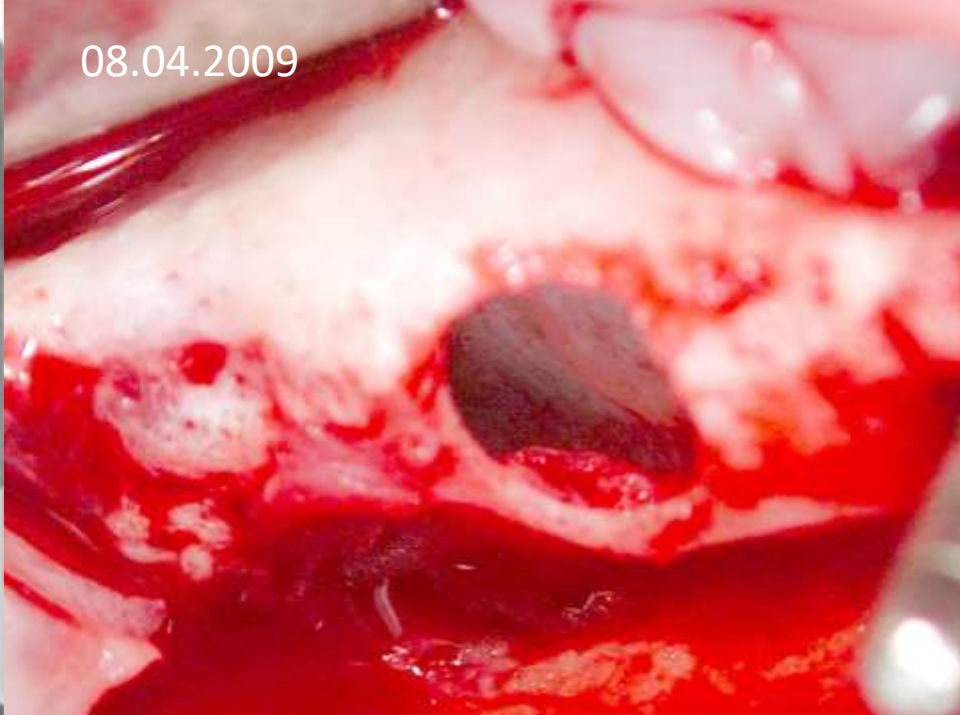
Ossification / Remodelling of the augmented Sinus

Suprastructure

08.04.2009



08.04.2009



17.04.2009

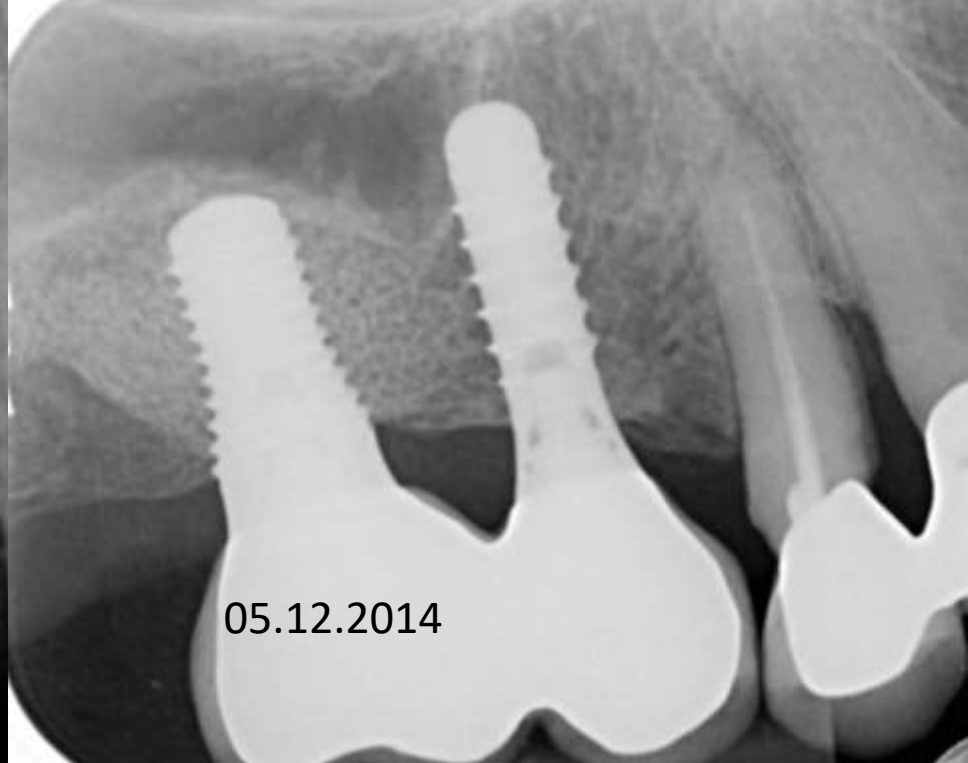


17.04.2009





08.04.2009



05.12.2014



17.11.2015



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Ossification / Remodelling of the augmented Sinus

Suprastructure

aus: Pajarola, 2000
„Eine Anleitung zur
schonenden Zahnentfernung“

Zahnextraktion mit System

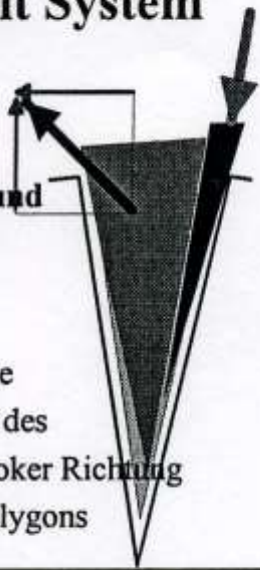
- Physik:

- Beachtung physikalischer und
mechanischer Grundlagen:

- Kräftepolygon:

Bei starrer Umgebung und ohne
Reibung erfolgt die Bewegung des
keilförmigen Körpers in reziproker Richtung
Berücksichtigung des Kräftepolygons

ZPO 2000

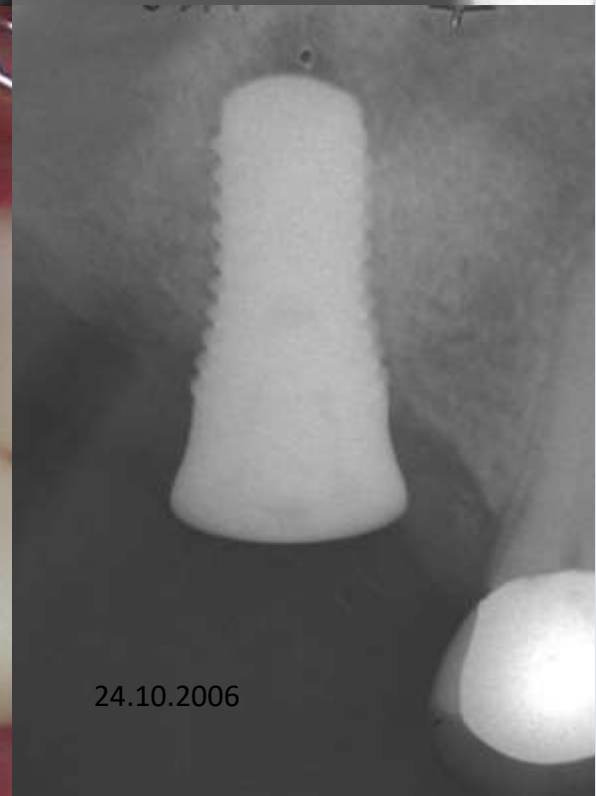


«Die minimalinvasive Implantattherapie beginnt nicht erst beim Implantieren, sondern startet bereits vor der Zahnextraktion», so PD Dr. Ronald Jung.

E. Urs, 42-jährig, 17.10.2005



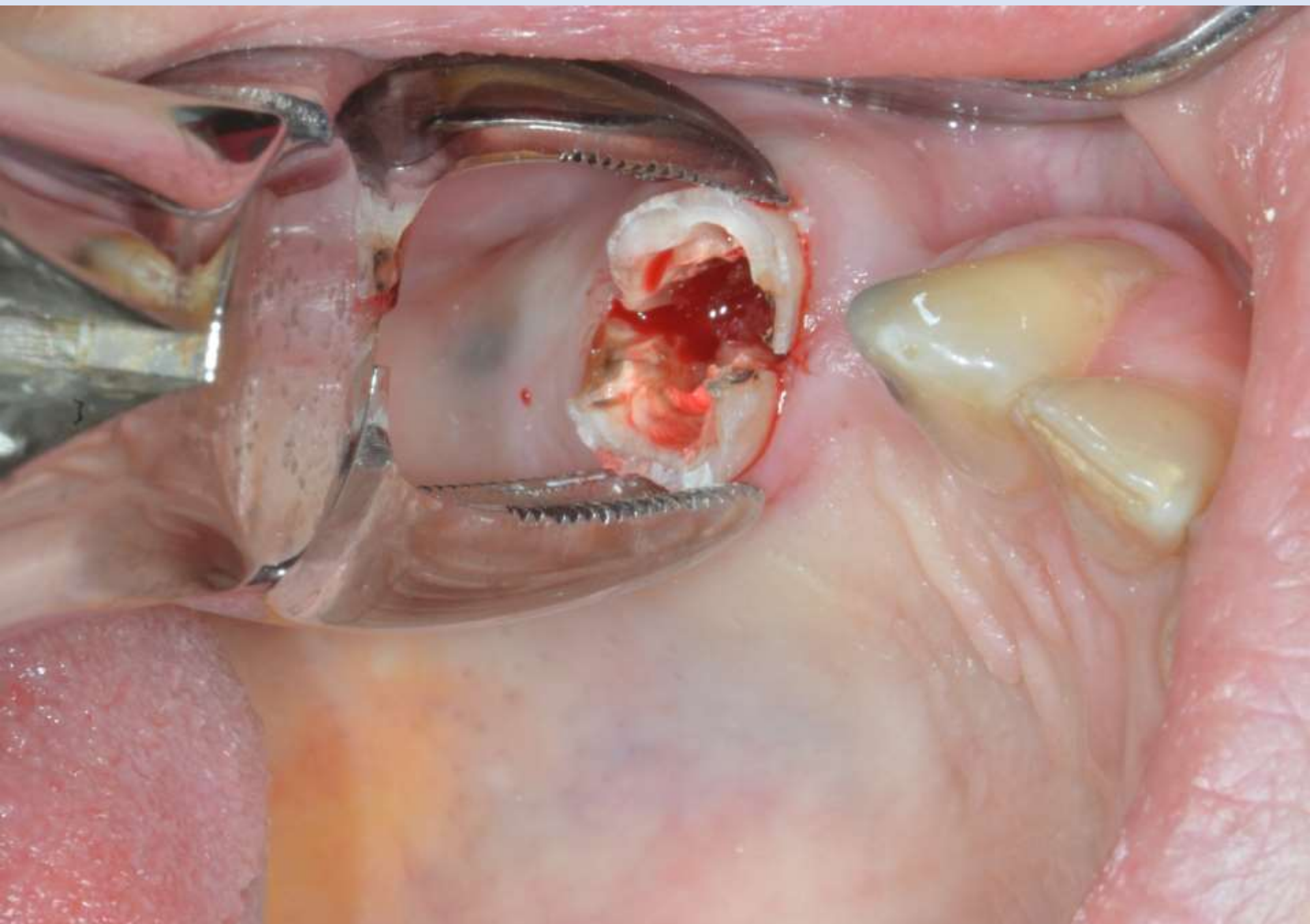
30.03.2006



E. Urs, 42-jährig, 17.10.2005

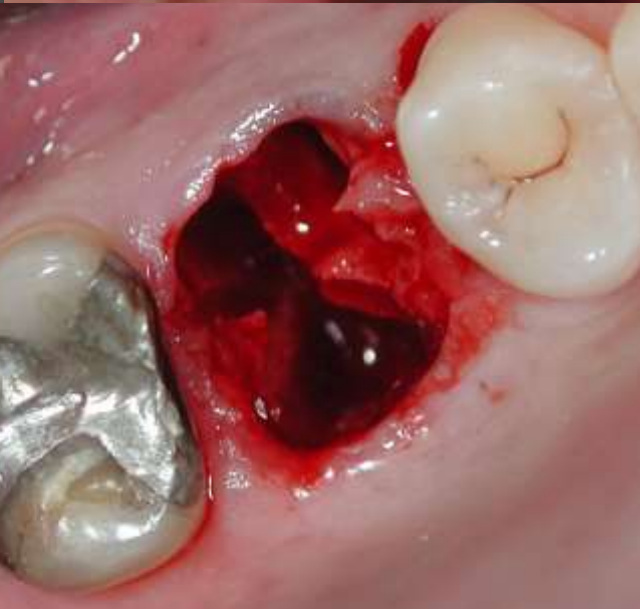
24.10.2006

24.10.2006









Minimally invasive

from the extraction to the wound closure

The approach with the Benex elevators

Extraction

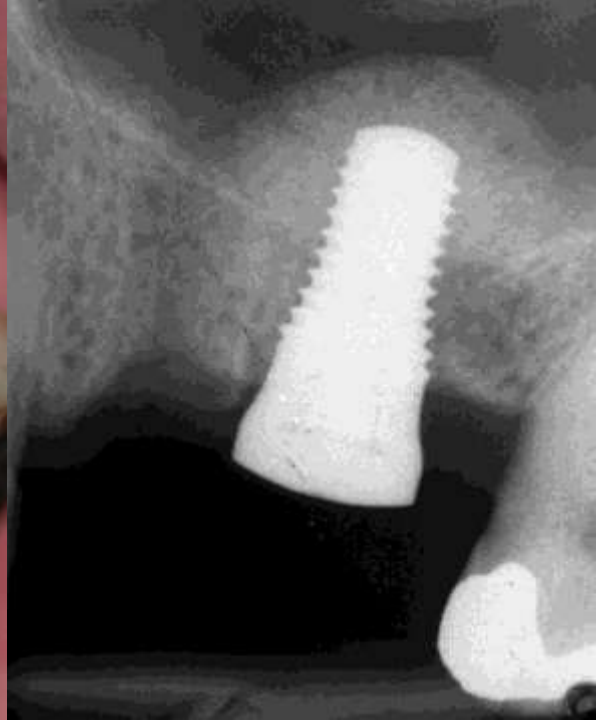
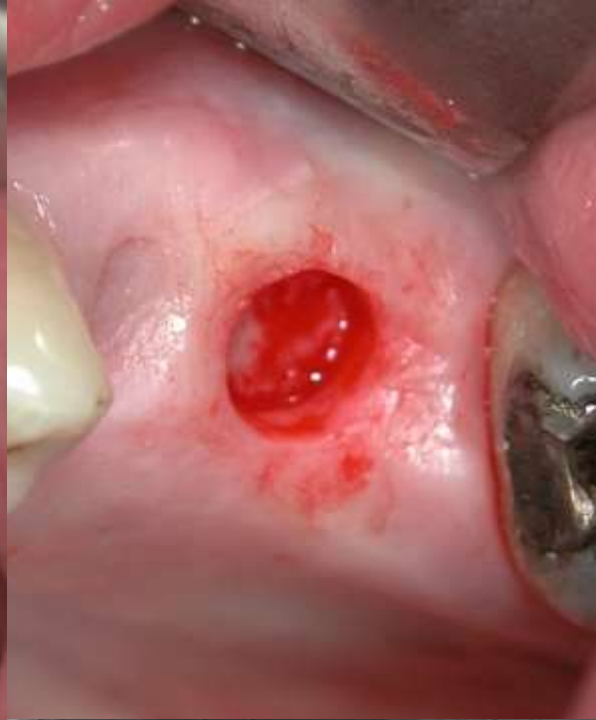
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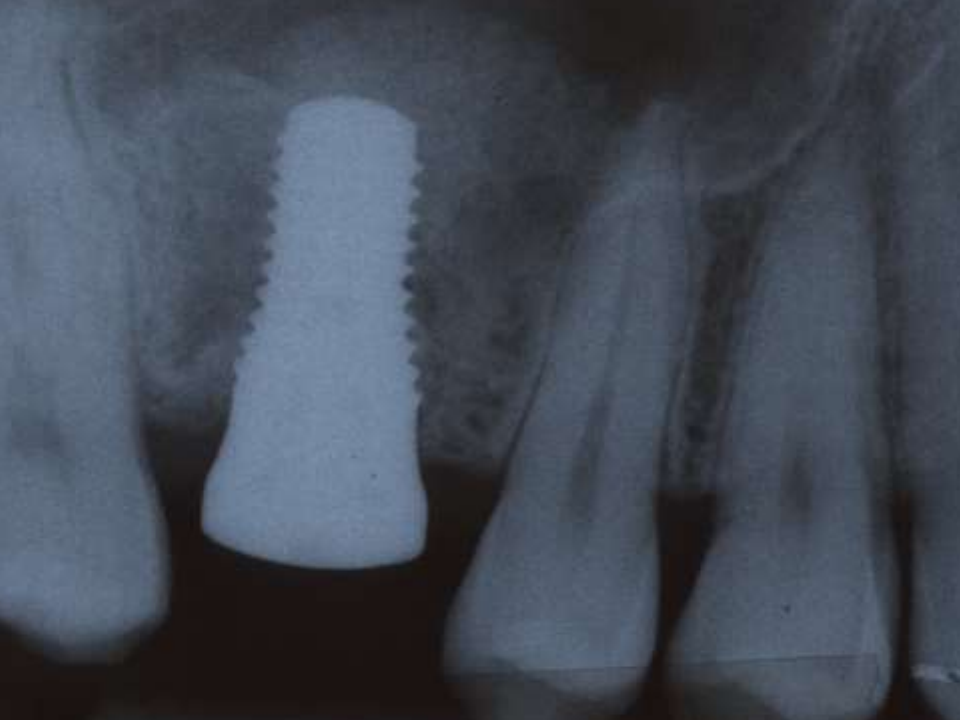
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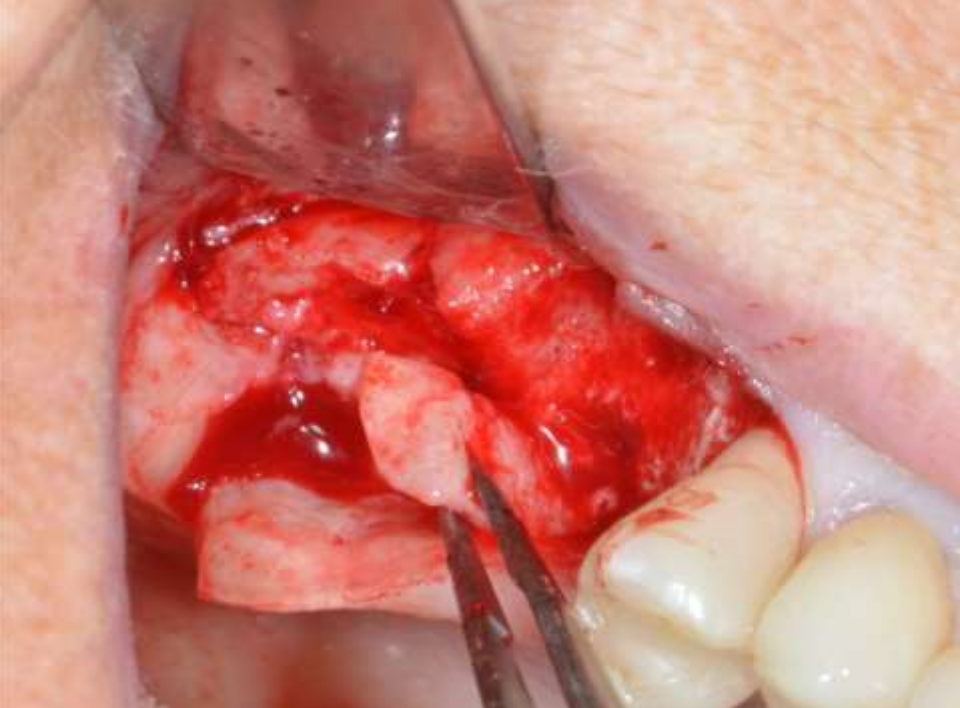
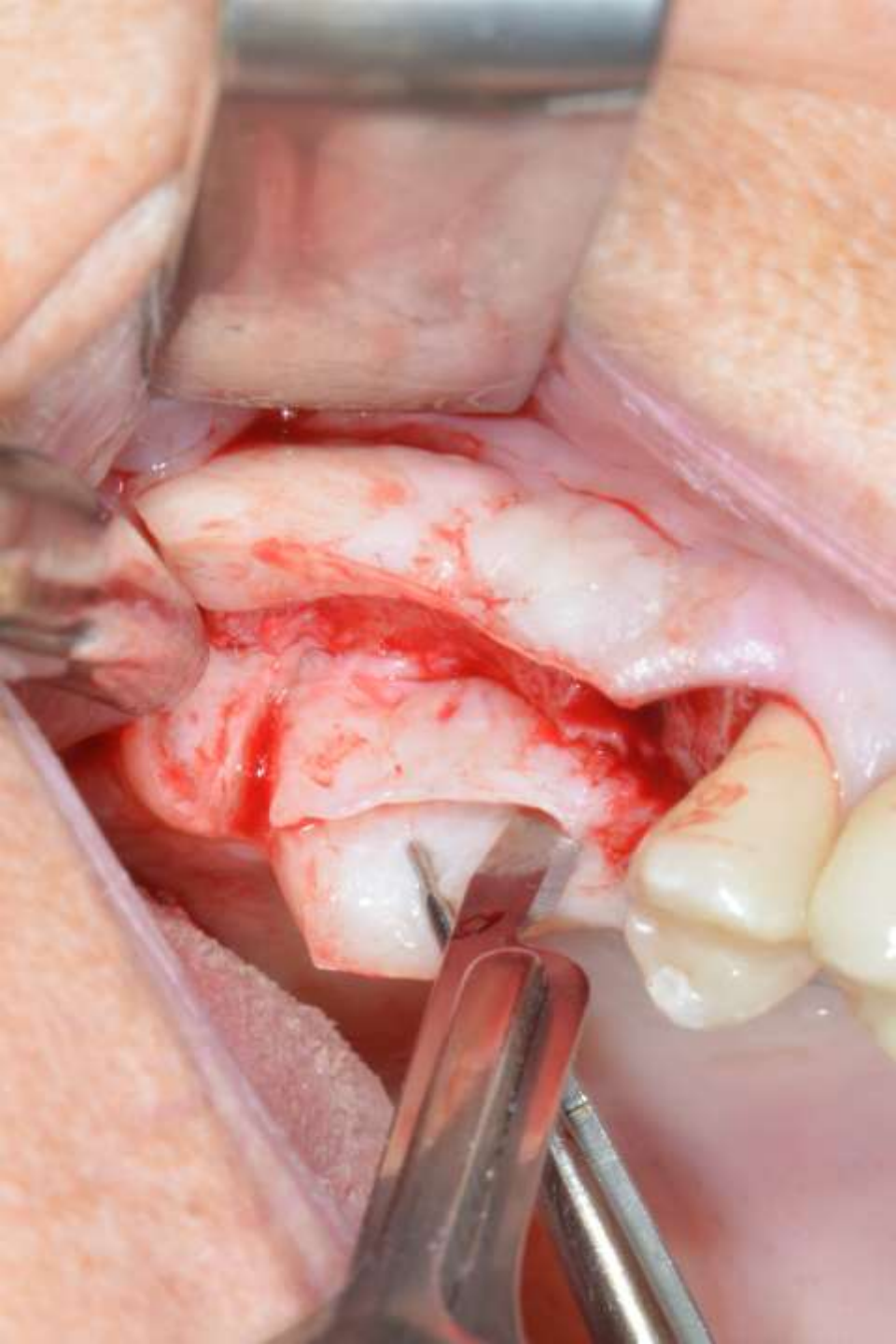
Suprastructure

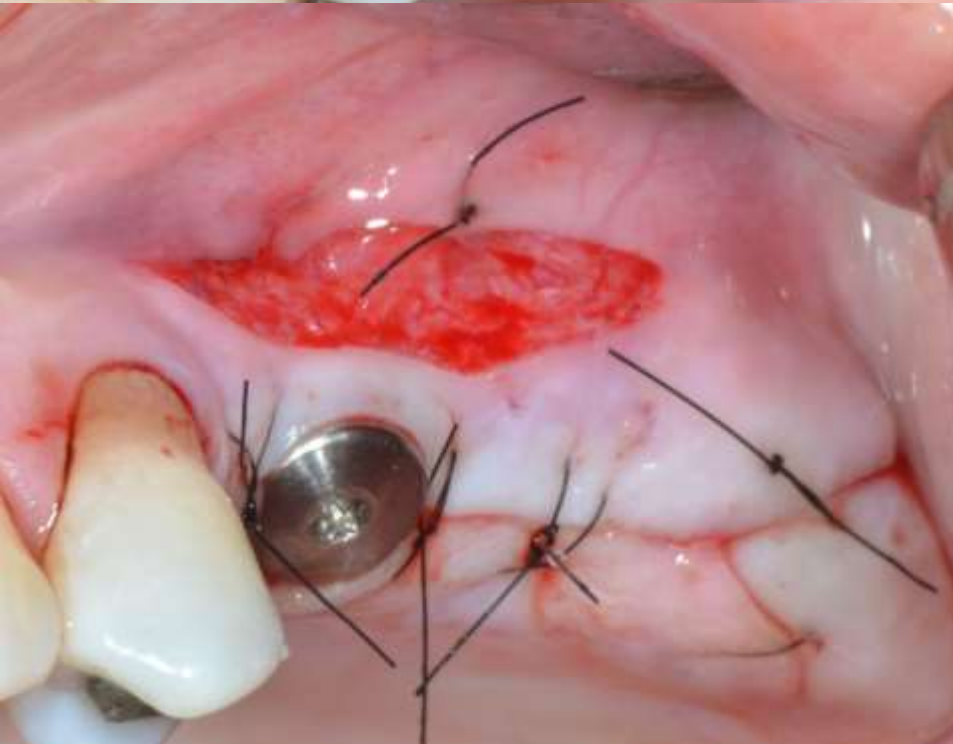




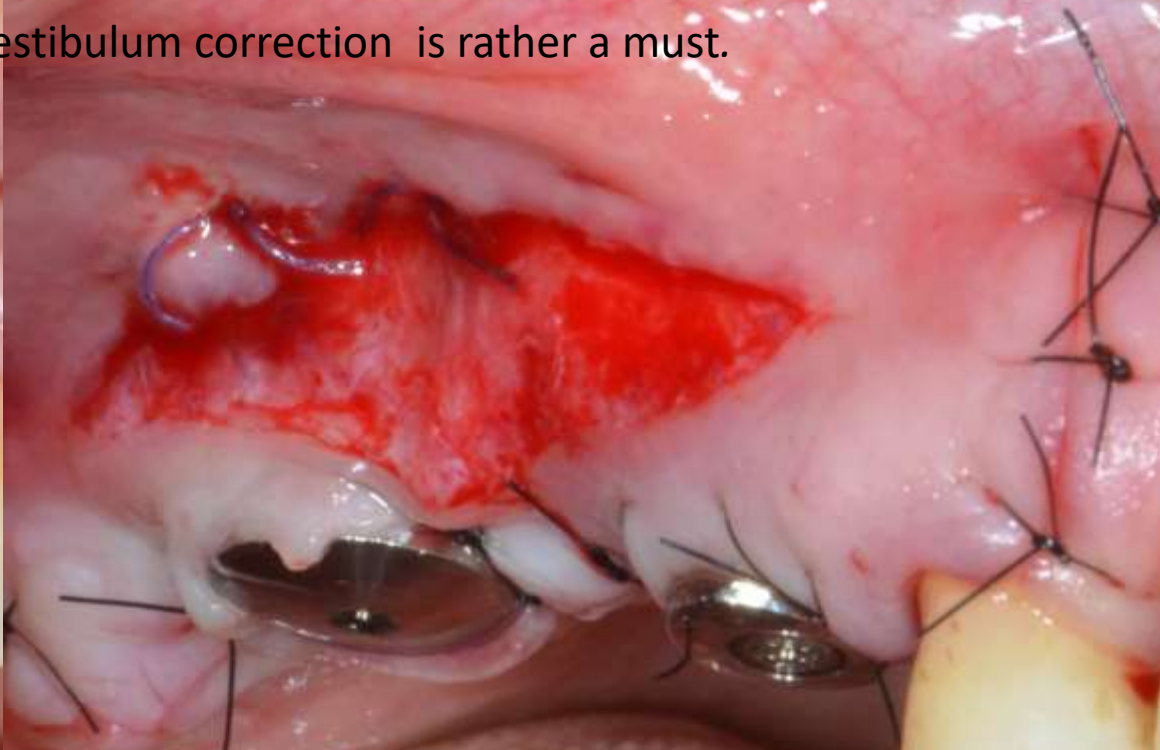
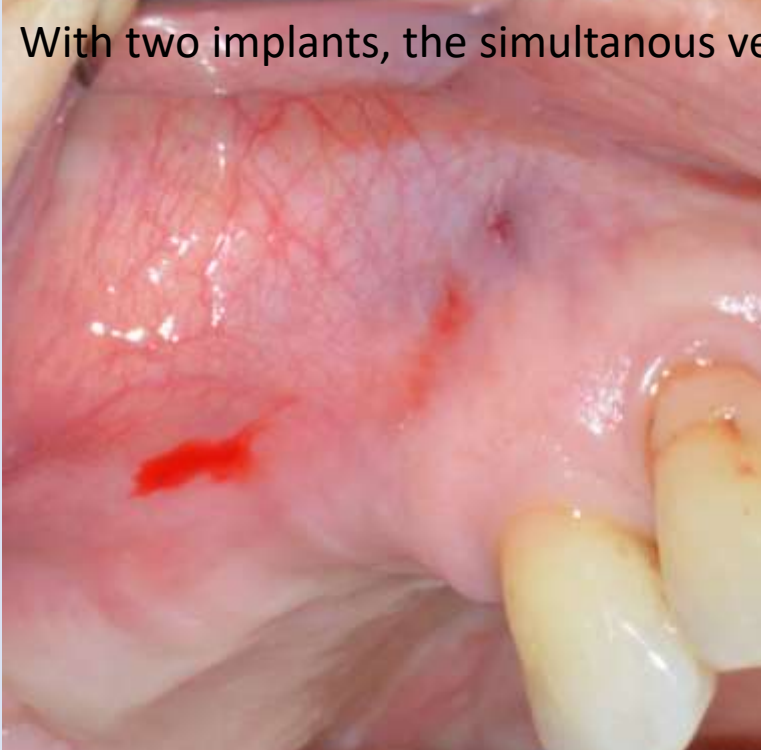








With two implants, the simultaneous vestibulum correction is rather a must.



Minimally invasive

from the extraction to the wound closure

The approach with the Benex elevators

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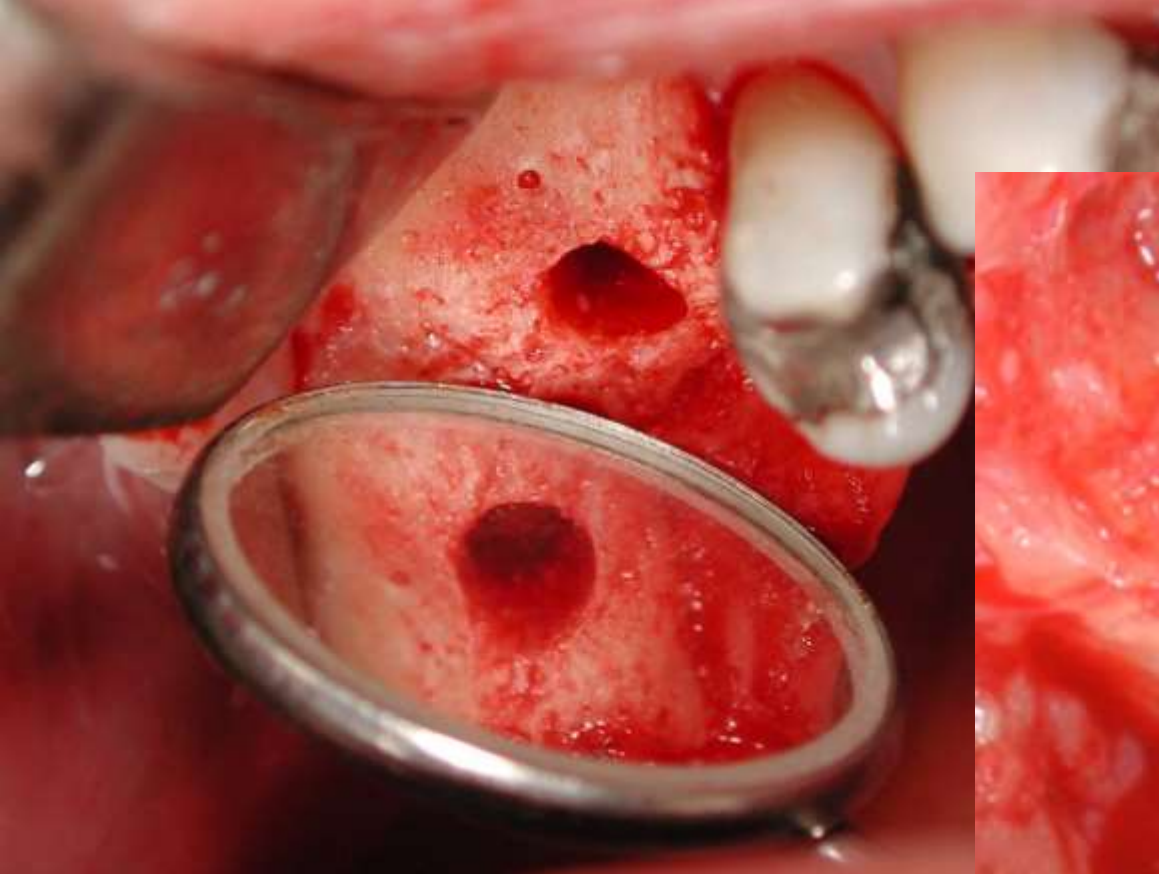
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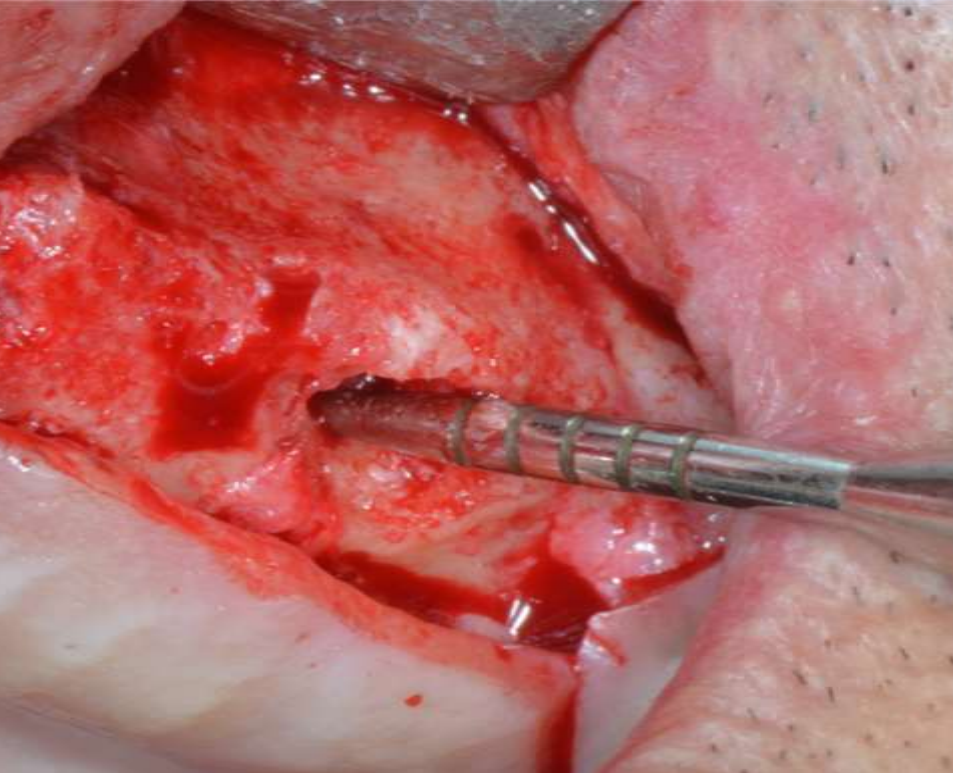
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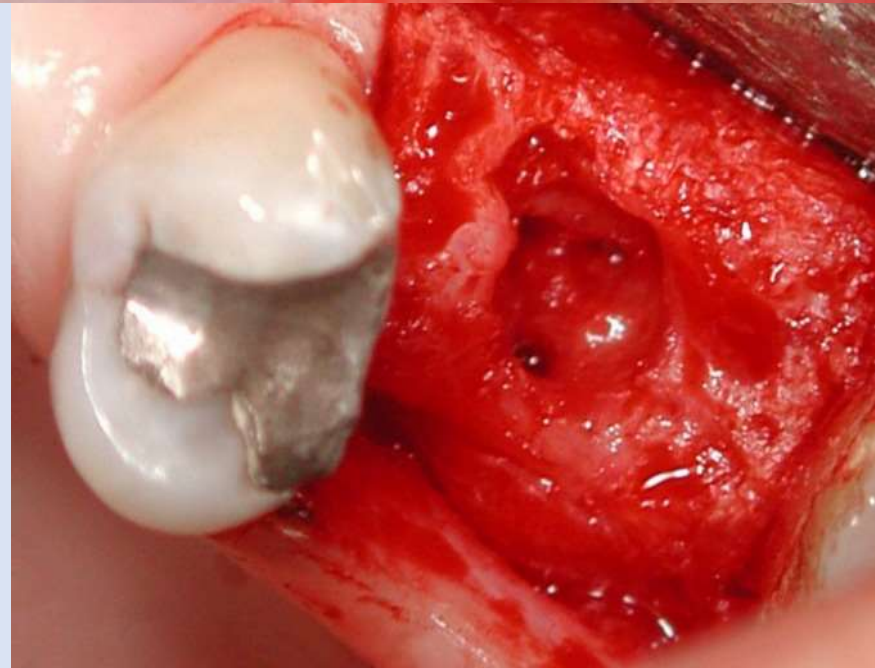


Operate under sight



Breakthrough of the sinus corticalis

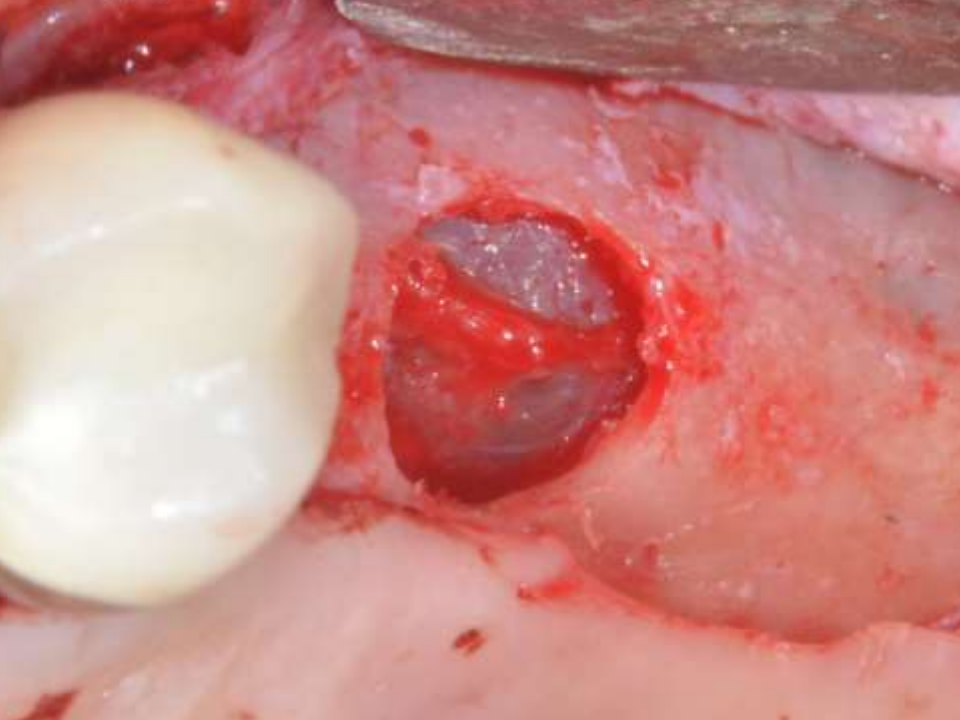
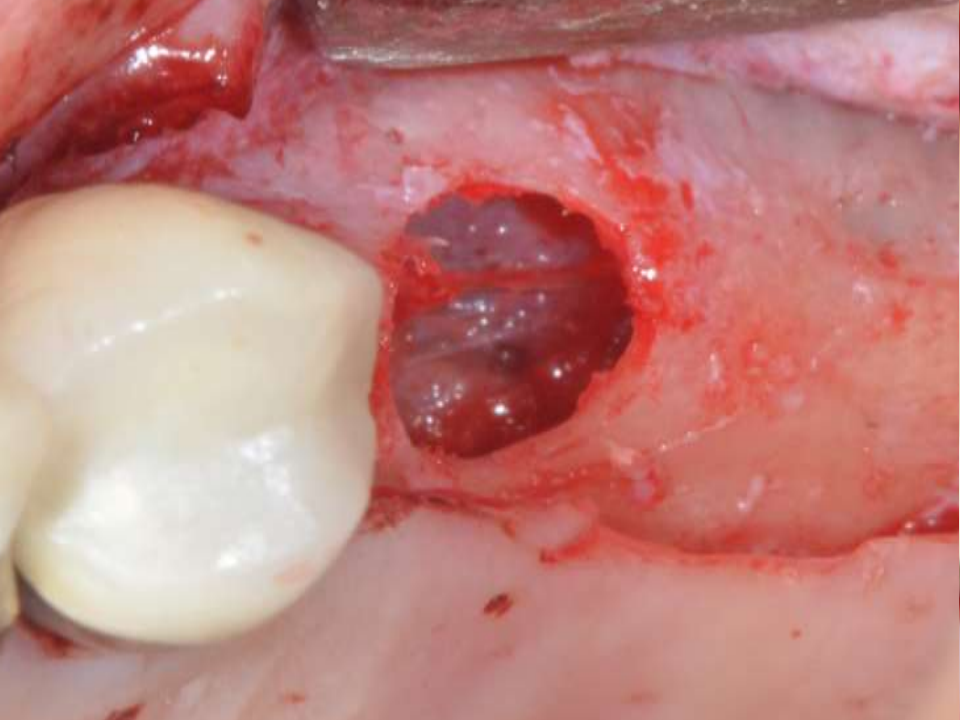
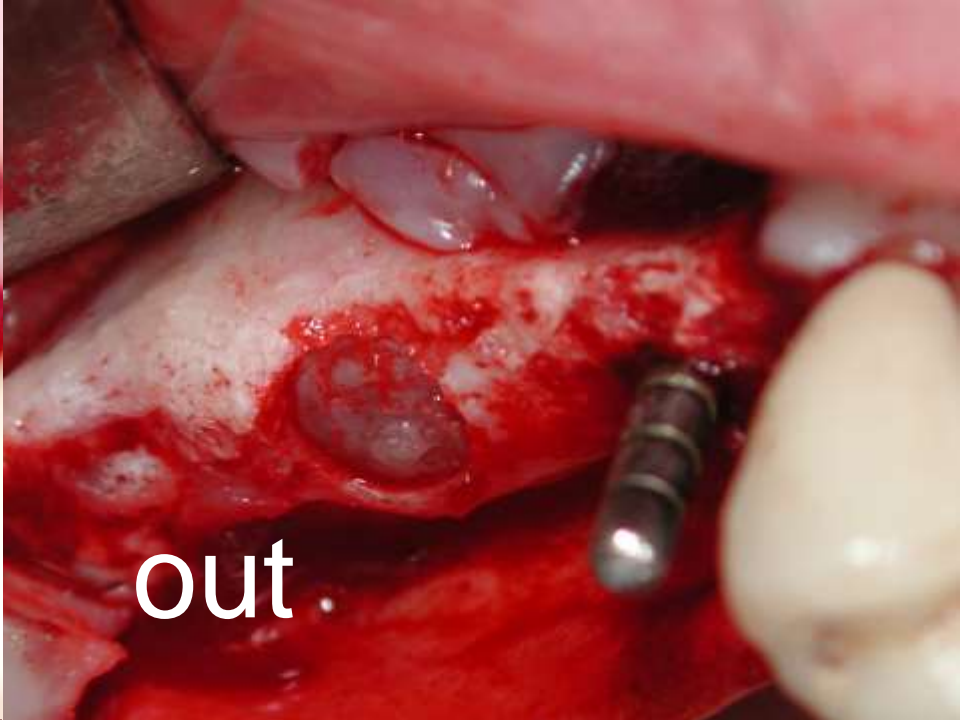
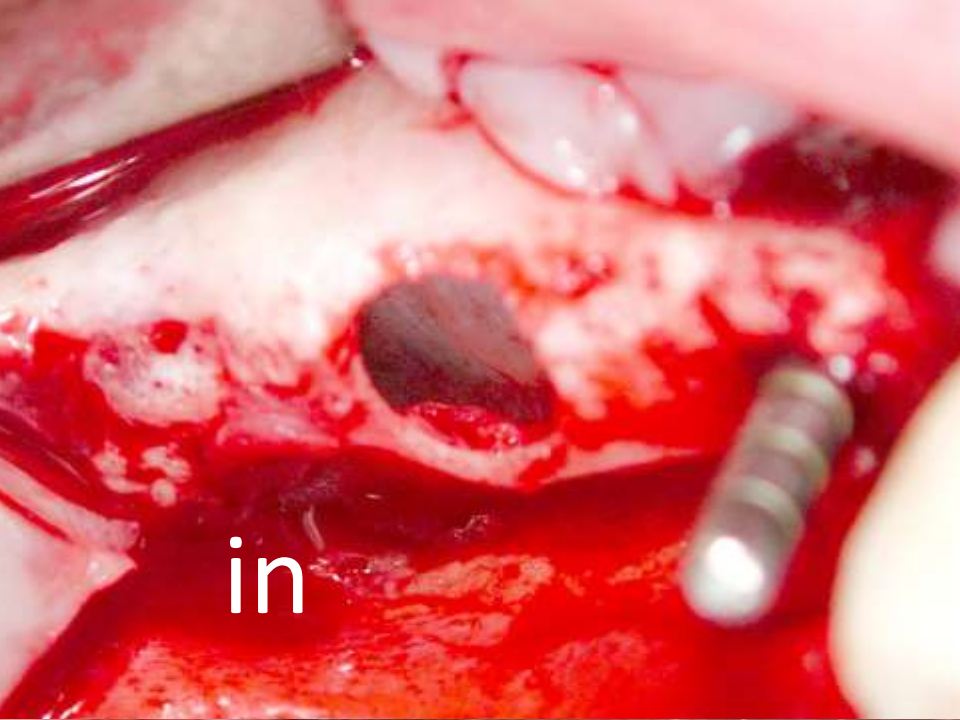
- Reduction of the corticalis thickness with the diamond drill
- Create breakpoints with the finest, convex osteotome



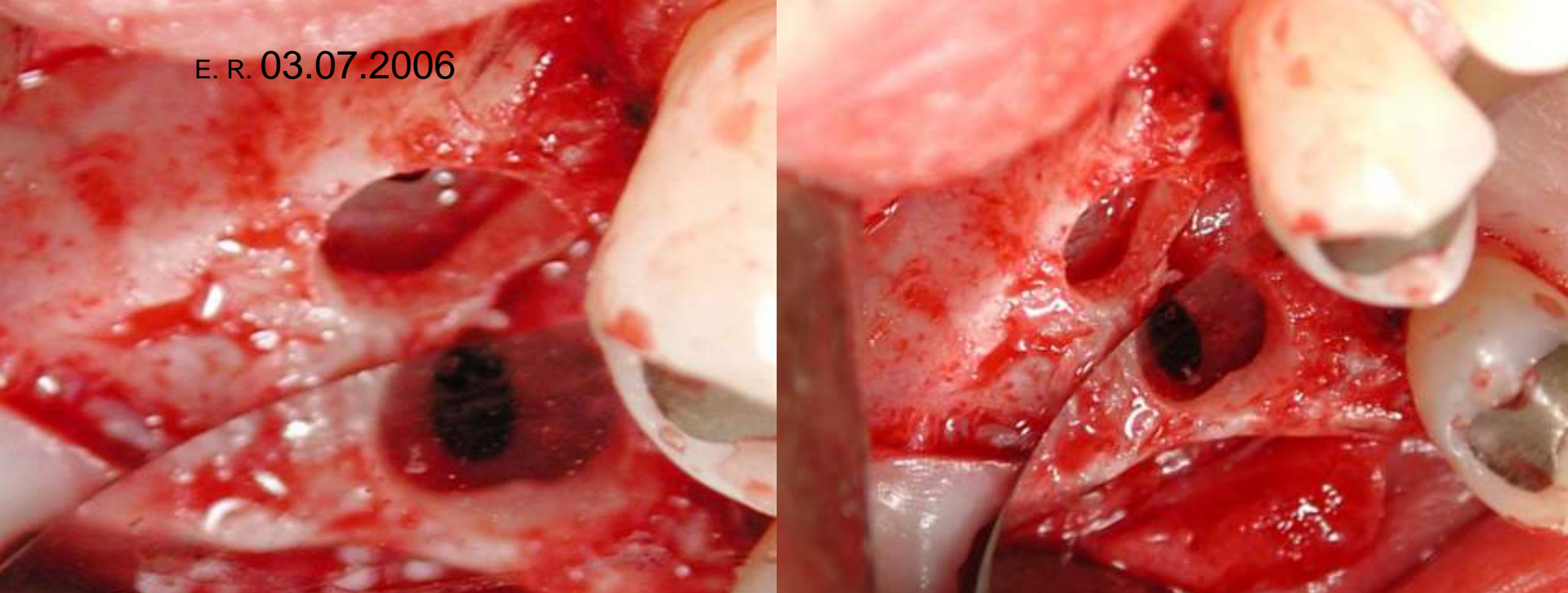
The nasal blow test

- Repeat frequently
- Inhalation *and* Exhalation





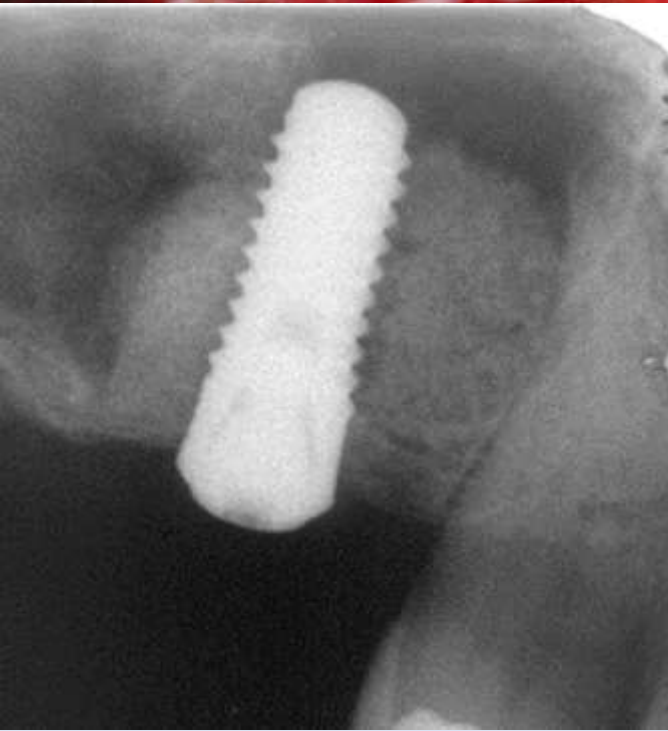
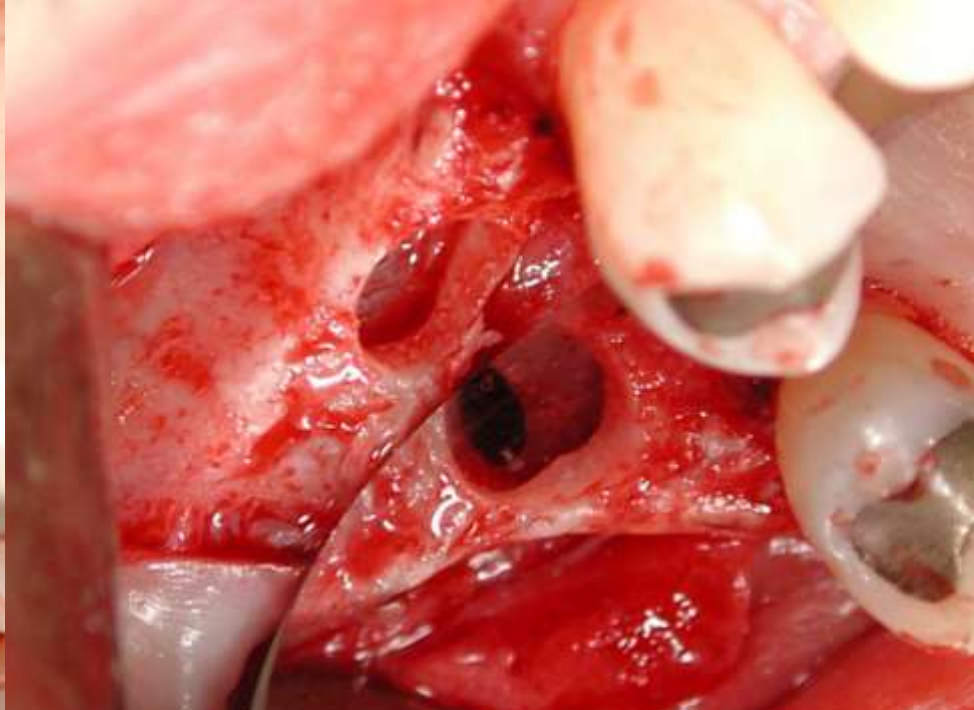
E. R. 03.07.2006



Perforations happen: in my study ca 15% , in my follow cases (over 900) with about 10%

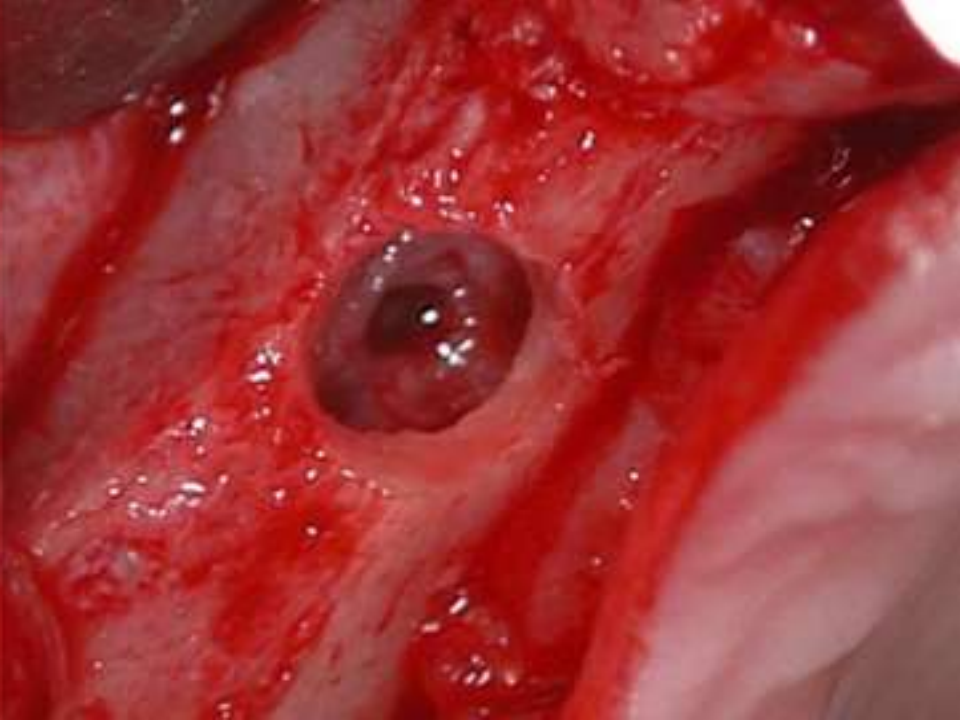
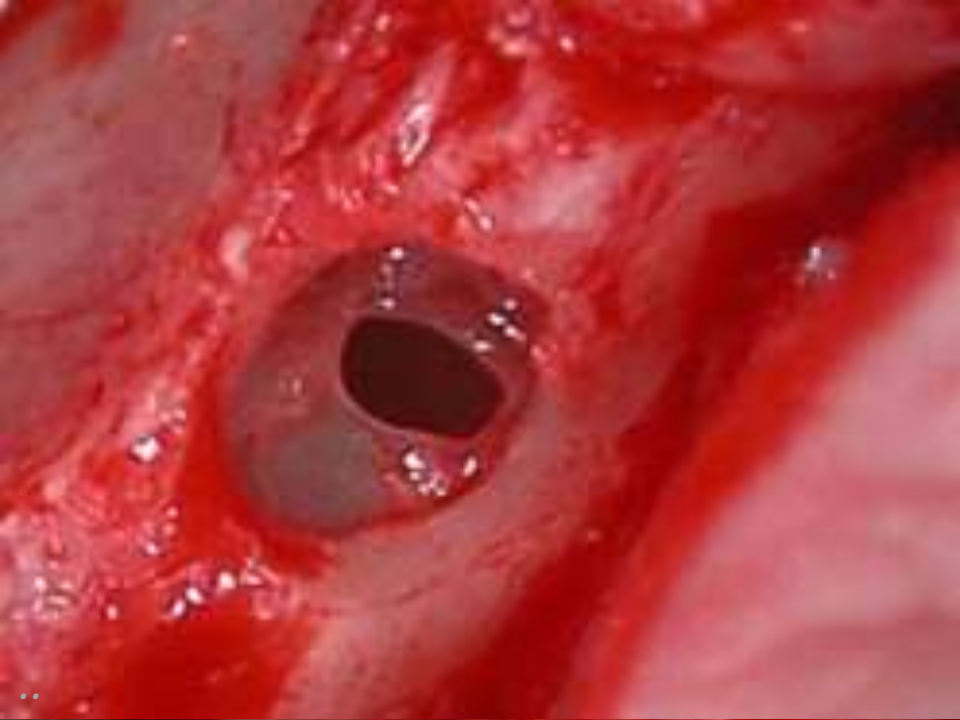
	Zahn- lokalisation	Absolute Häufigkeit			%		
		ja	nein	Total	ja	nein	Total
Schleimhaut- perforation	Molar	49	220	269	18.2	81.8	100
	Prämolar	15	135	150	10.0	90.0	100
	Total	64	355	419	15.3	84.7	100
					p=0.025		

E. R. 03.07.2006



E. R. 13.09.2016



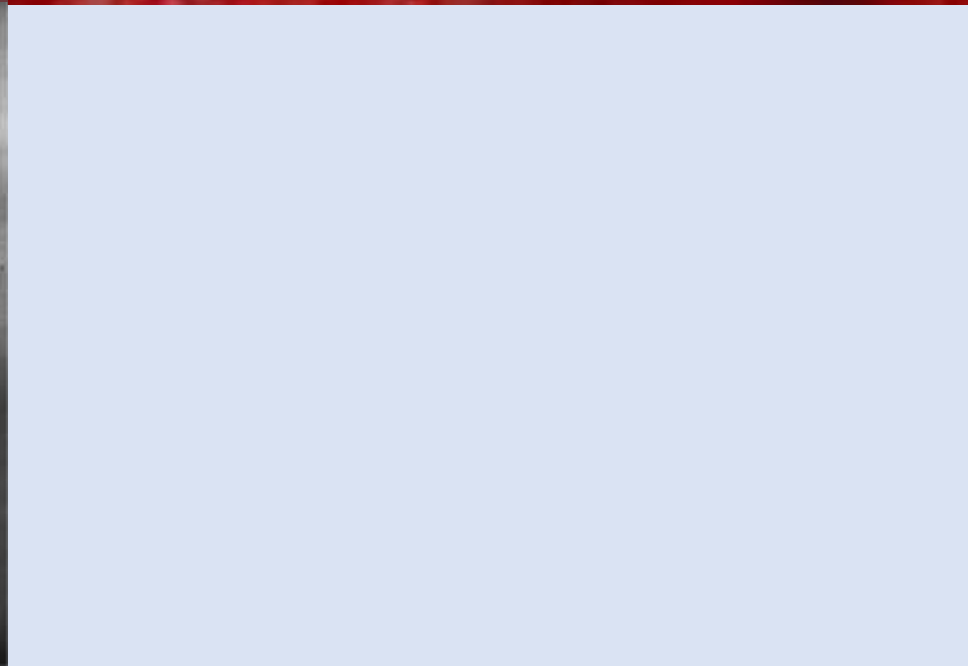




27.10.2008



27.10.2008





27.10.2008



27.10.2008



07.07.2015

Minimally invasive

from the extraction to the wound closure

The approach with the Benex elevators

Extraction

Soft tissue management

Tips und Tricks

Specialities: Sinus sept
buccocrestal defect
little subantral bone height

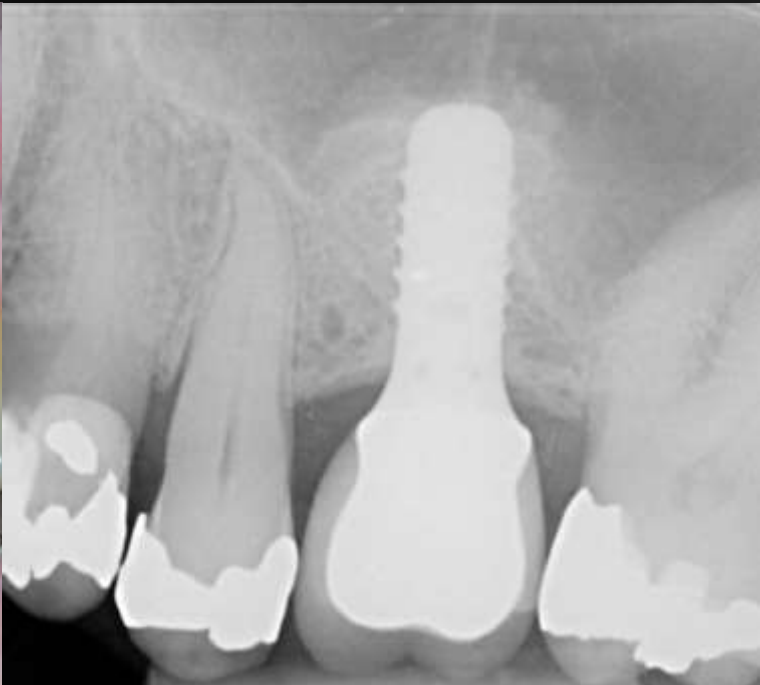
Ossification / Remodelling of the augmented Sinus

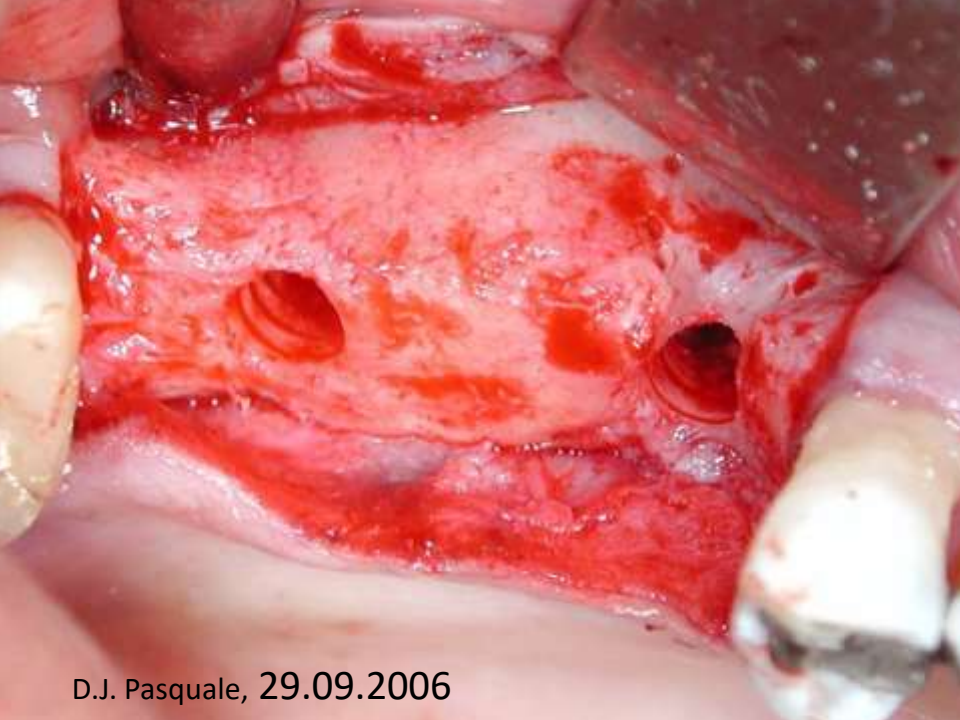
Suprastructure

G. Ch, 75-jährig, 29.09.2004

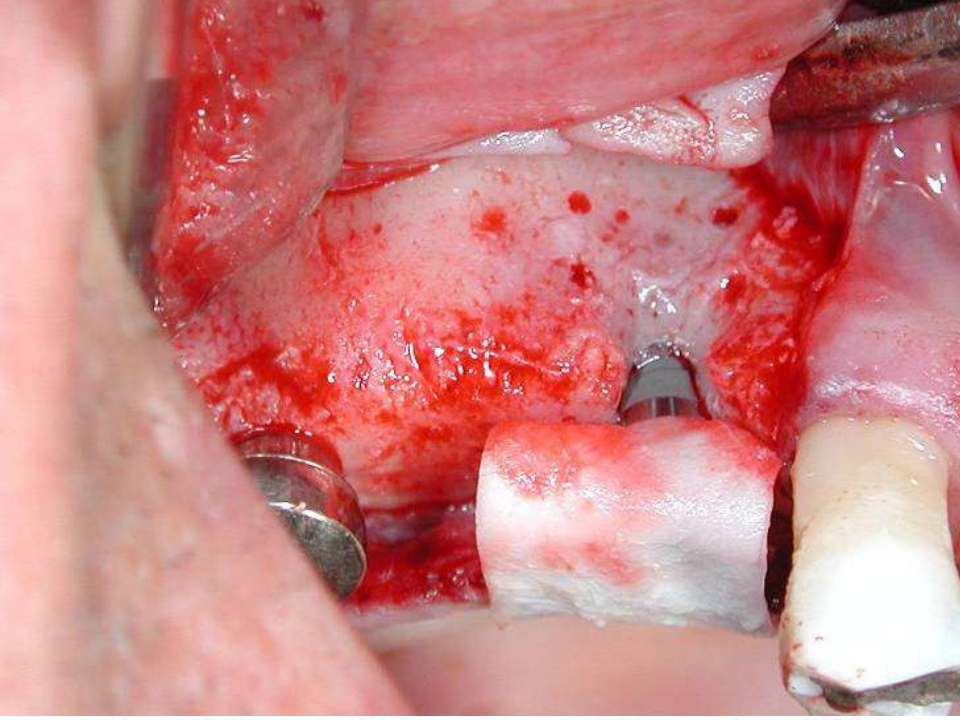


G.Ch, 87-jährig, 03.02.2016





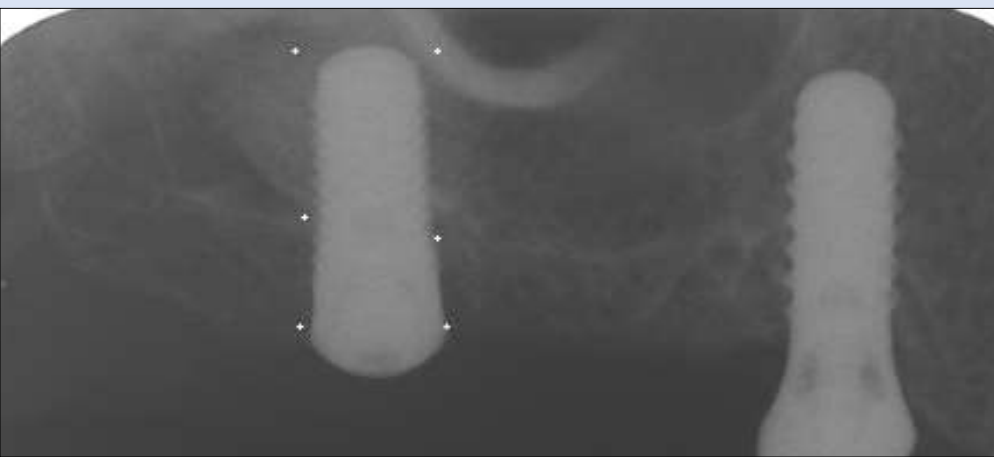
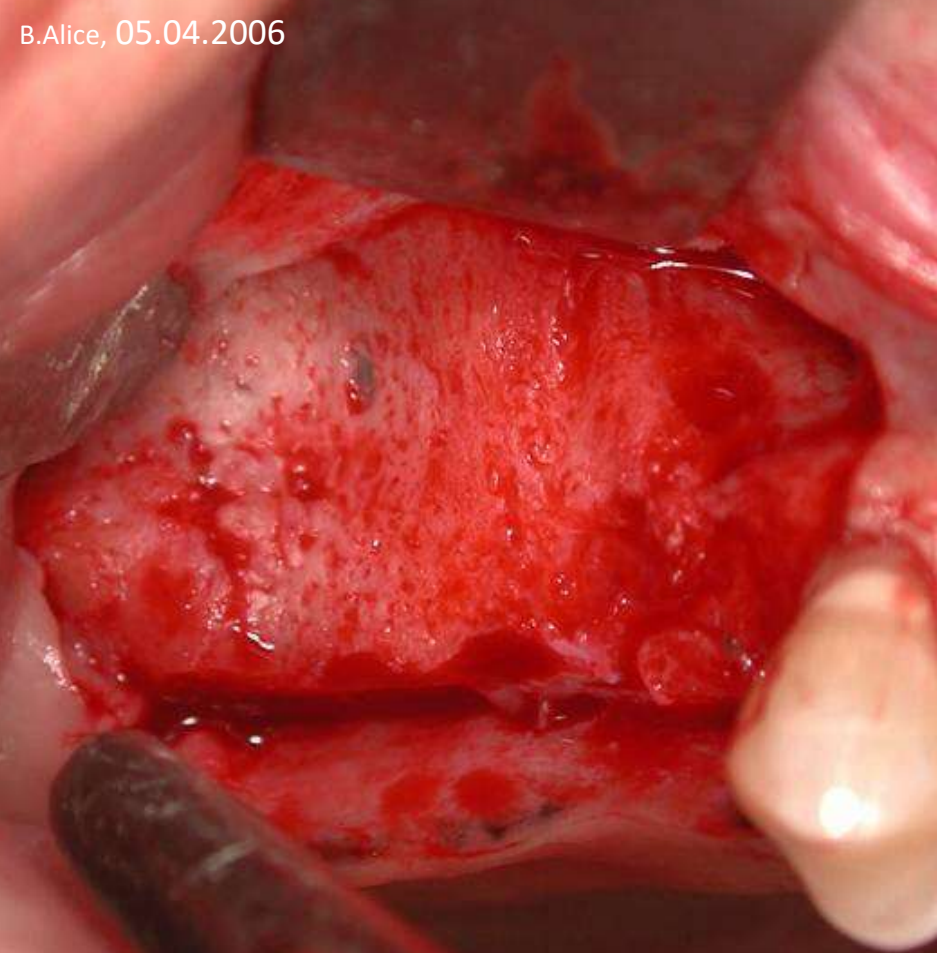
D.J. Pasquale, 29.09.2006



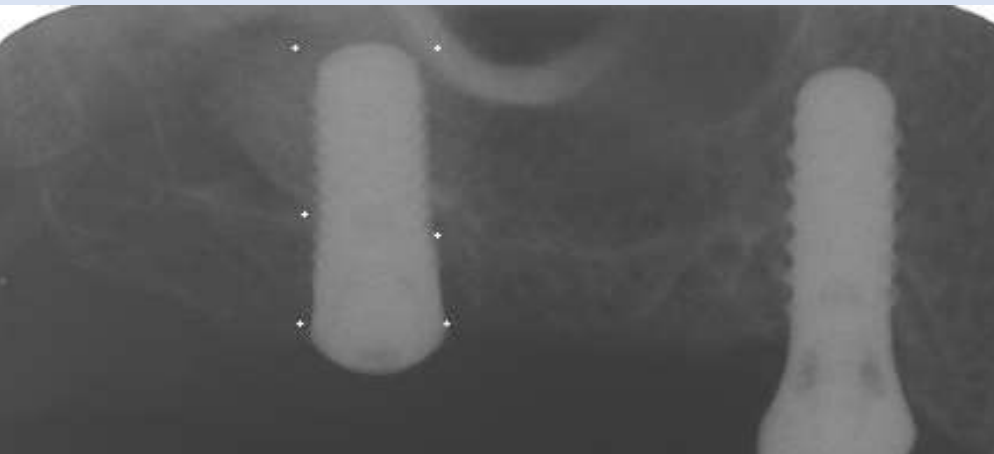
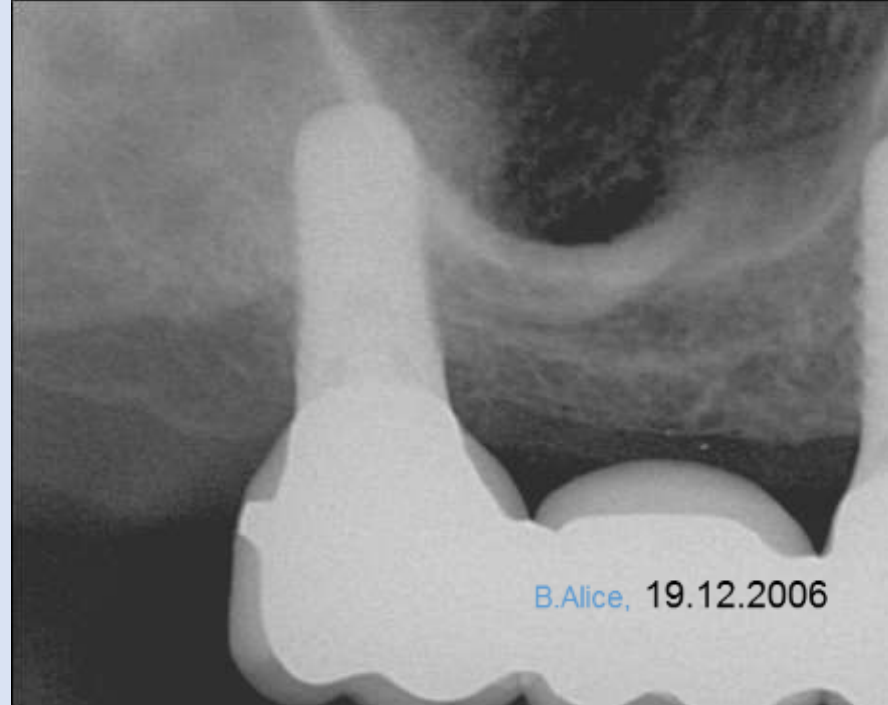
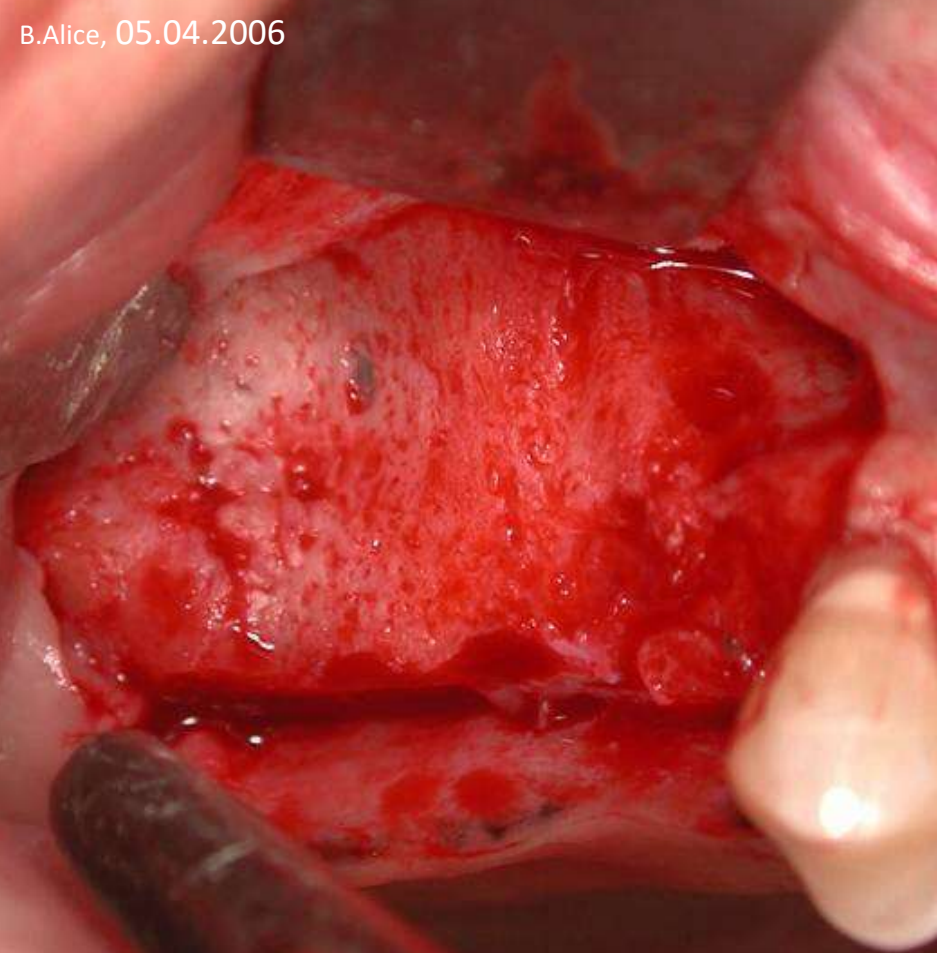


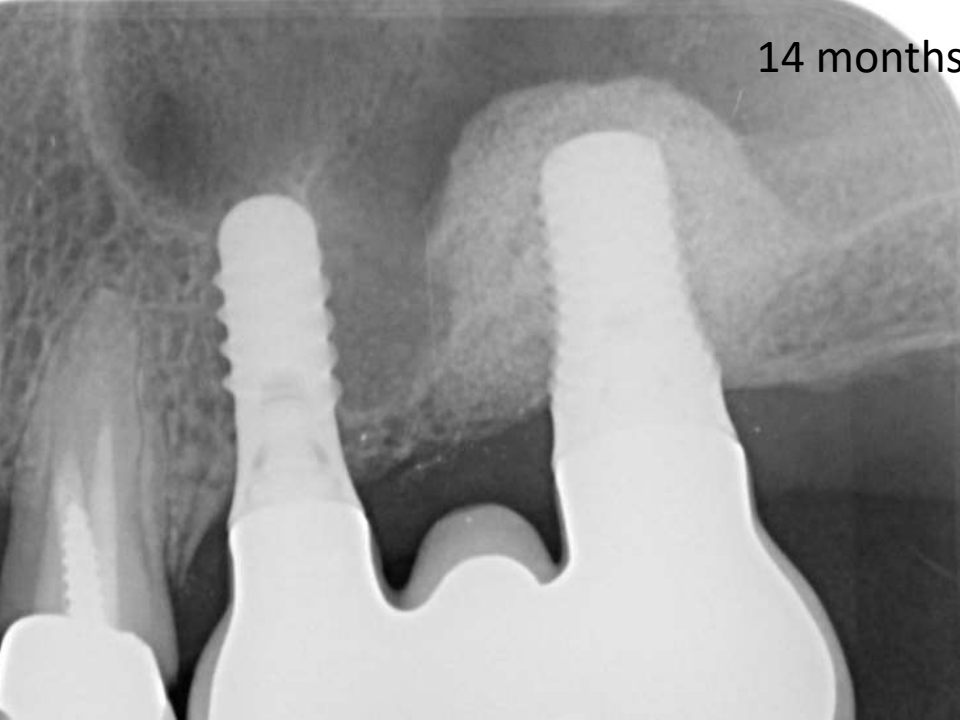
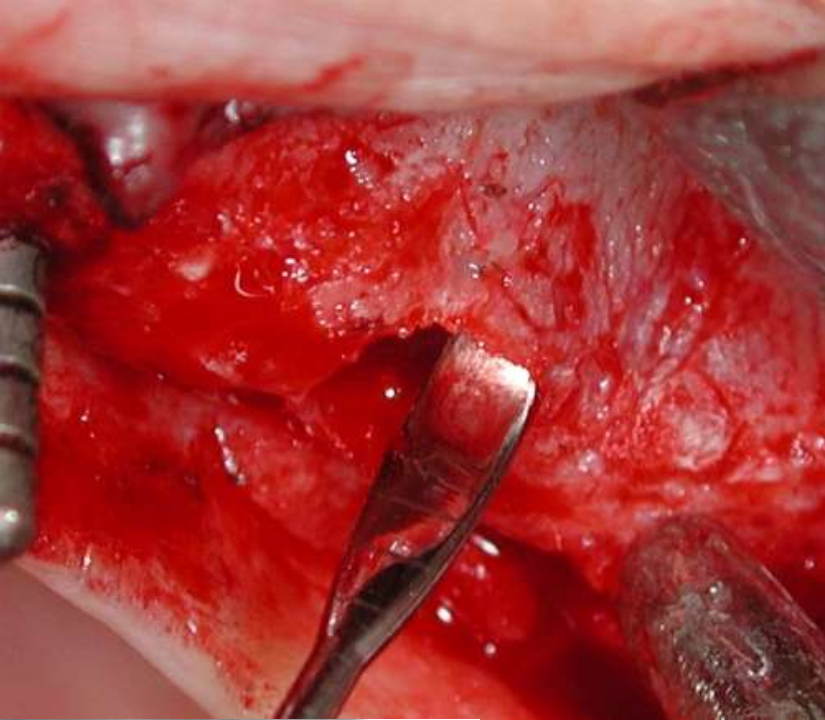
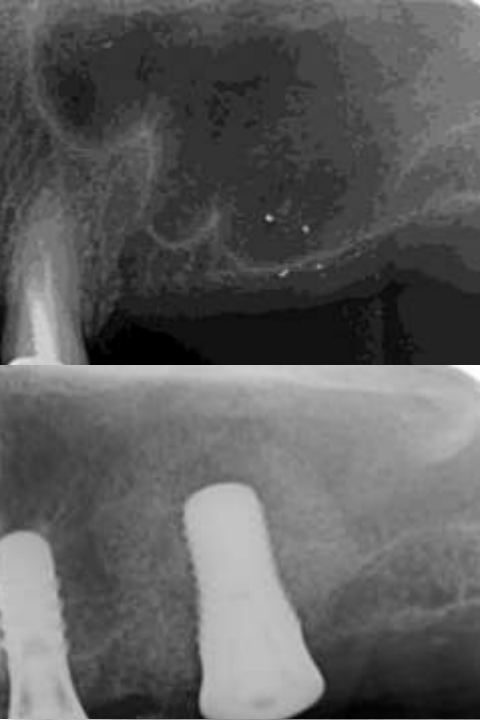


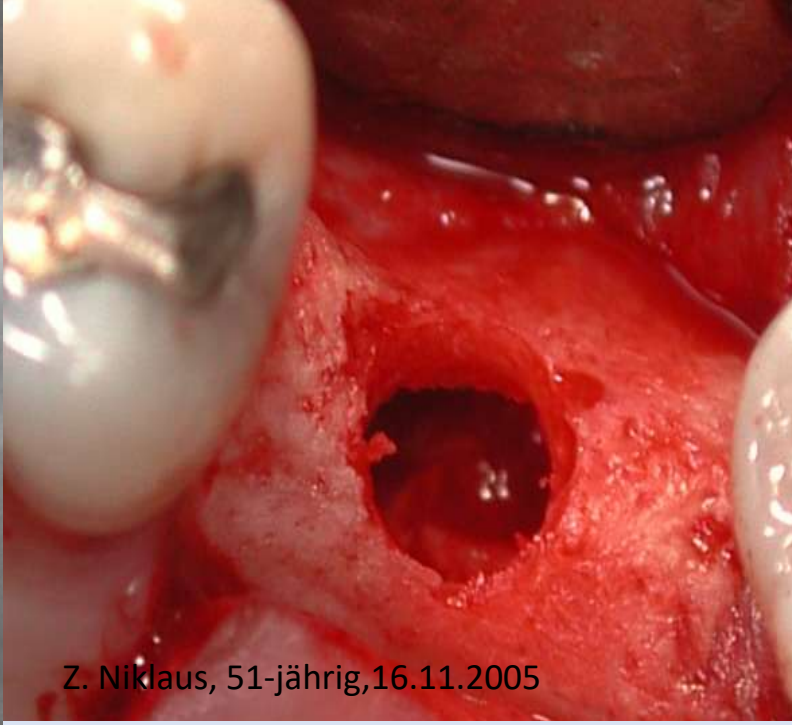




B.Alice, 05.04.2006



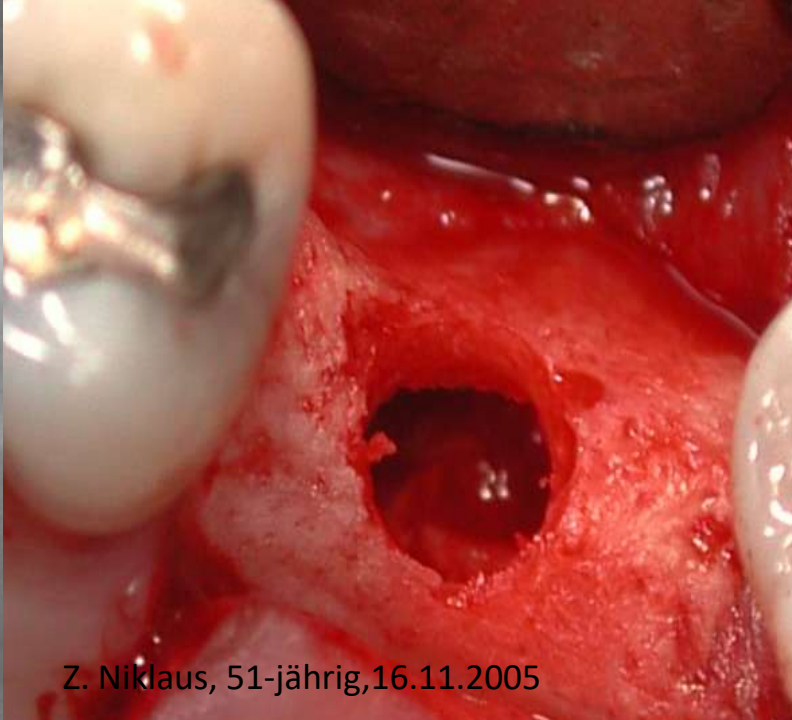




Z. Niklaus, 51-jährig, 16.11.2005



16.11.2005



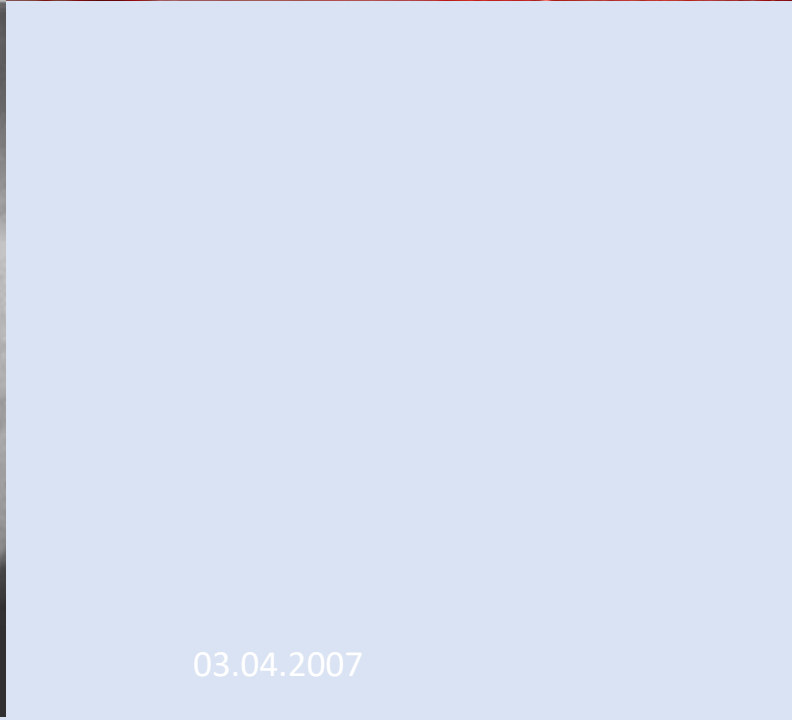
Z. Niklaus, 51-jährig, 16.11.2005



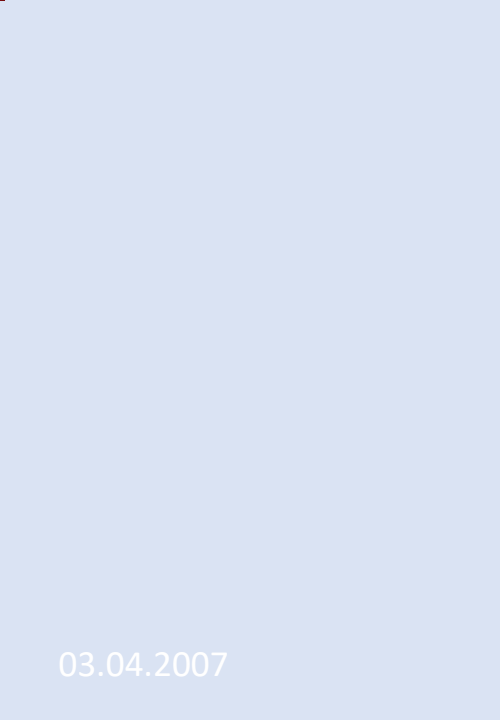
16.11.2005



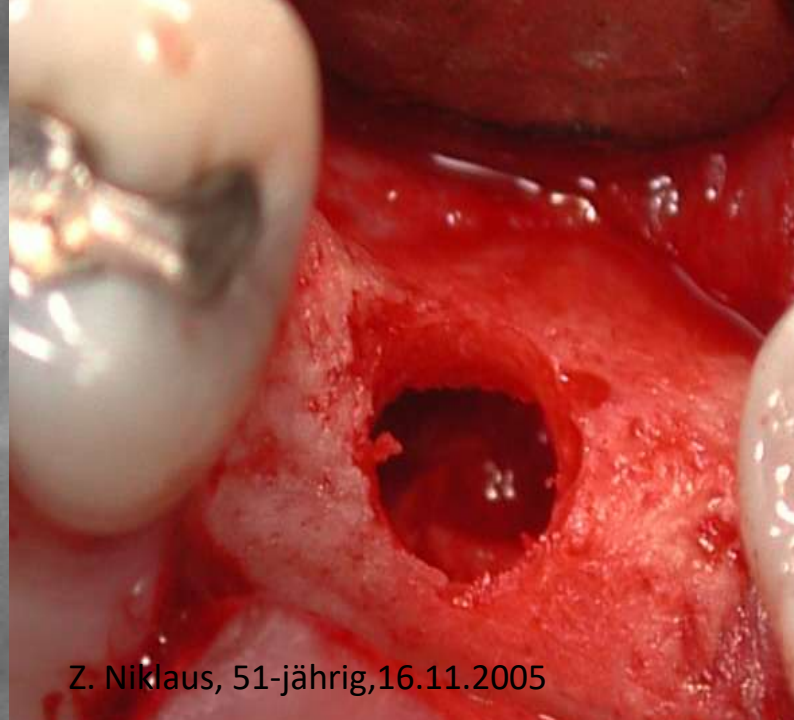
04.05.2006



03.04.2007

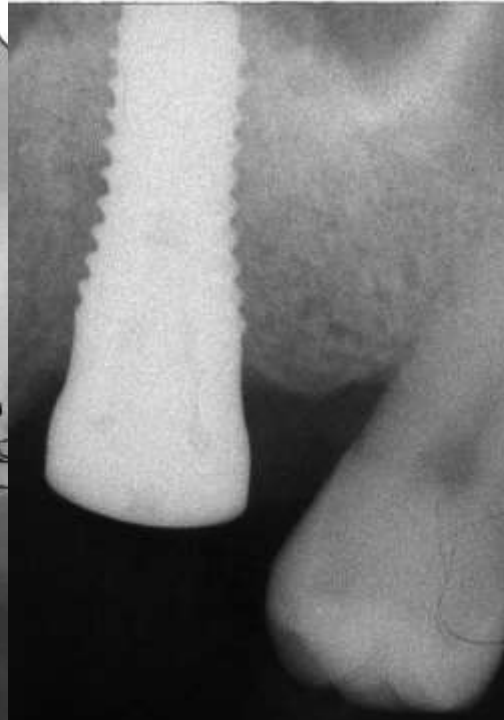


03.04.2007



Z. Niklaus, 51-jährig, 16.11.2005

16.11.2005



04.05.2006

03.04.2007



29.10.2013

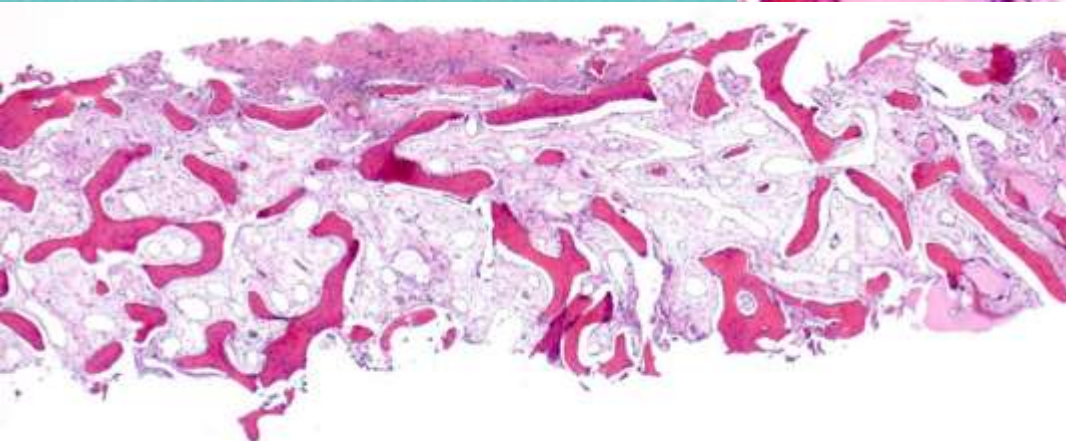
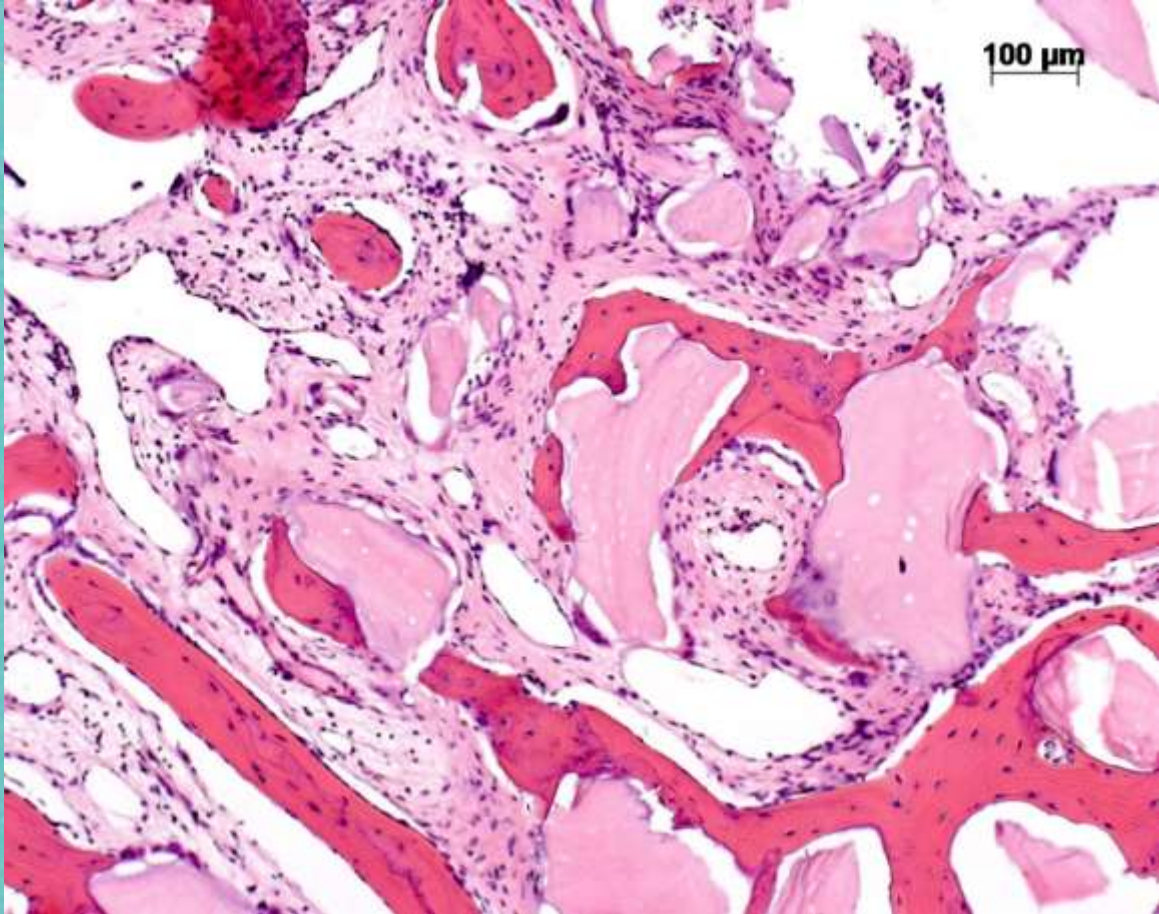


14.07.2014





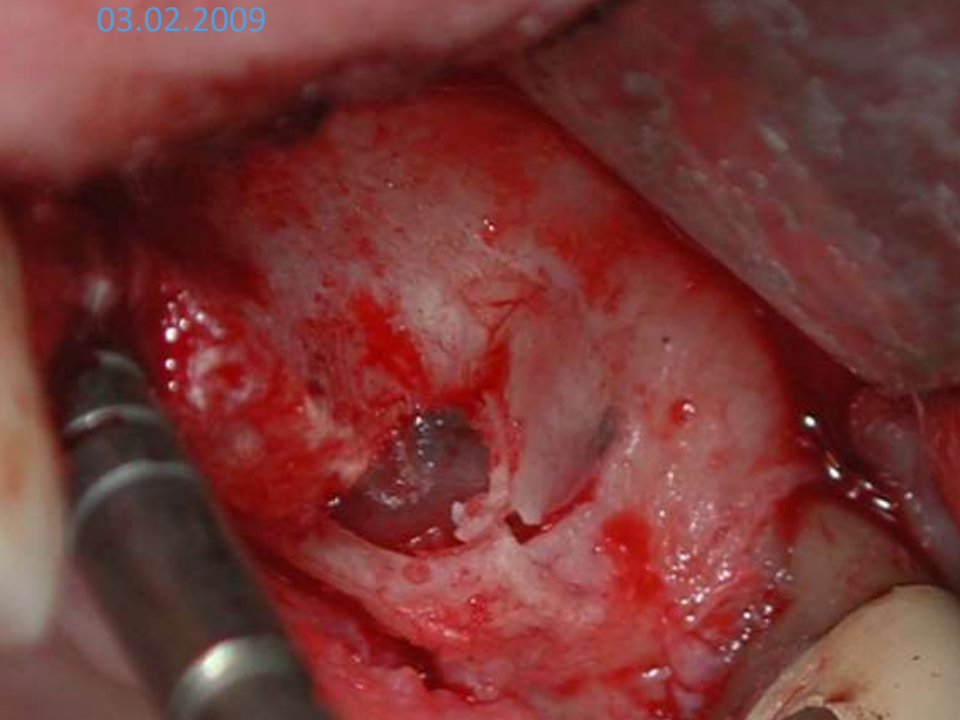
21.07.2014



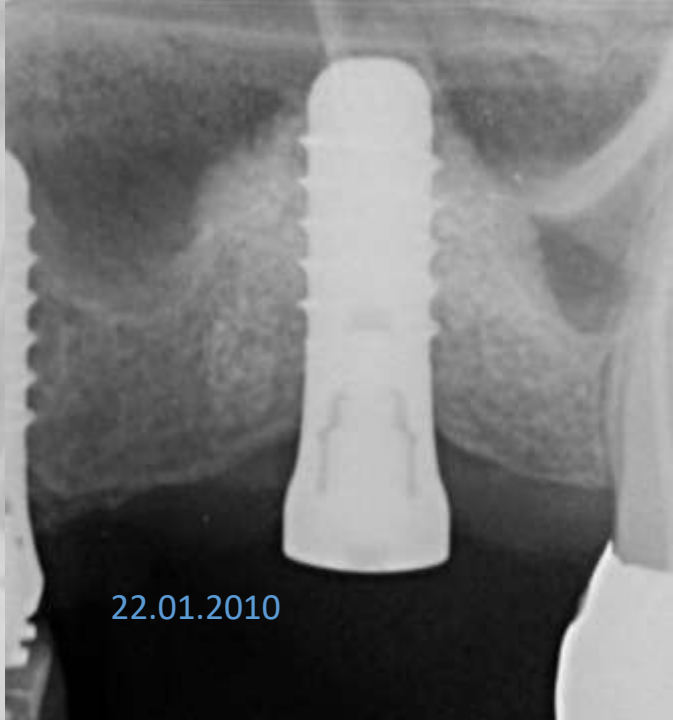
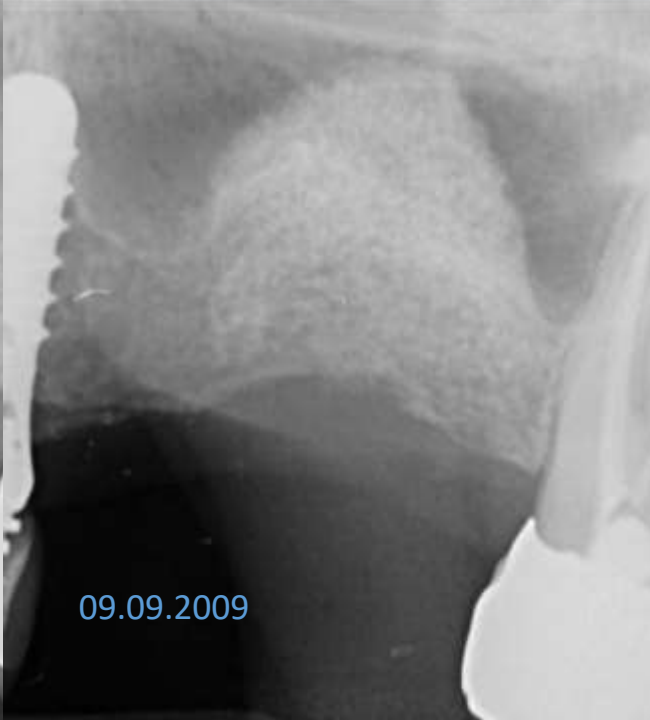
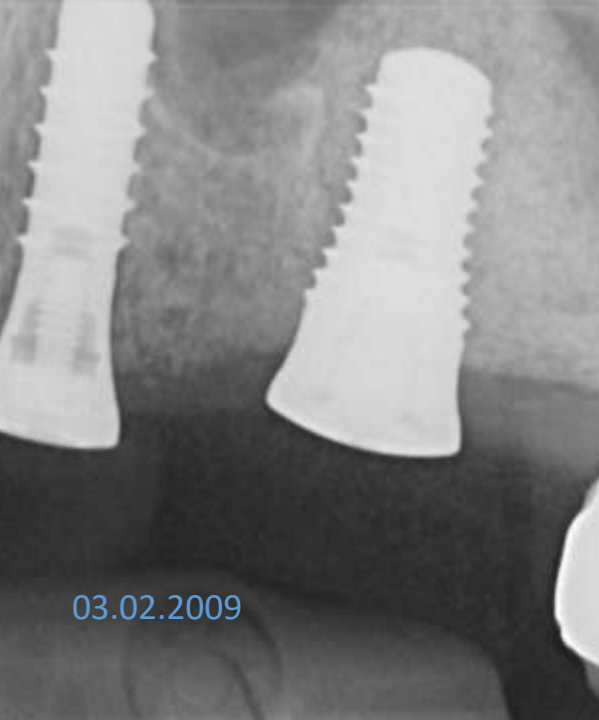
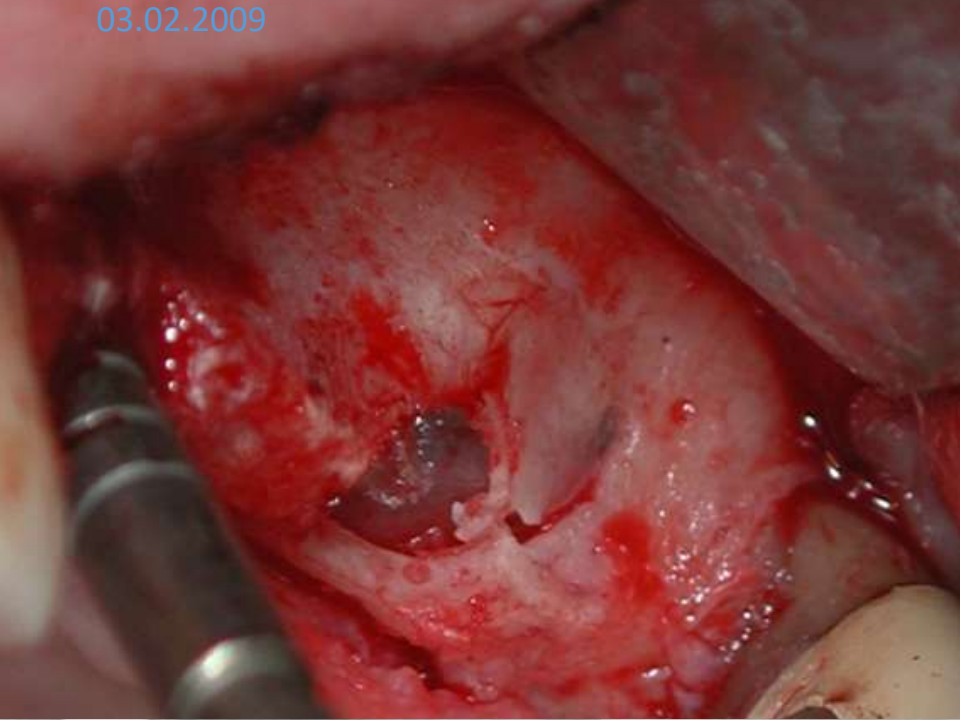
Azelluläre Knochenmatrix (BioOss)
mit umgebenden vitalen Knochenbälkchen

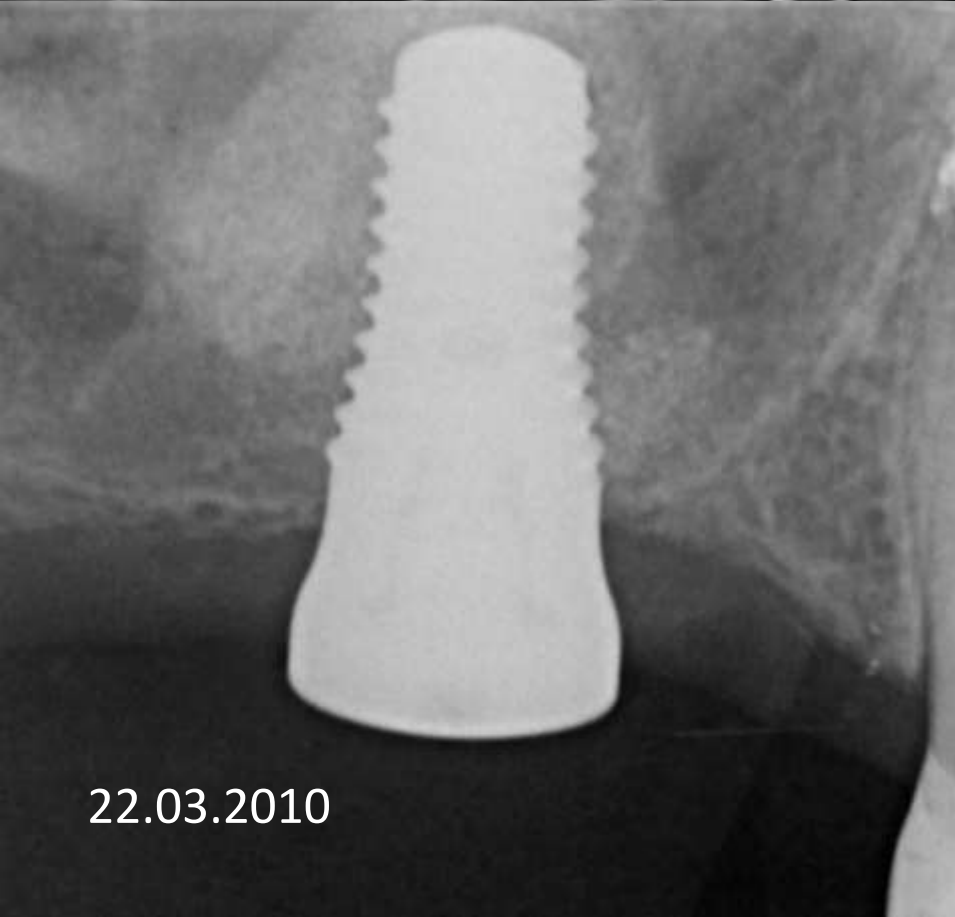
Interstitielles, nicht fibrosierendes Gewebe
ohne Fremdkörperreaktion
(keine Riesenzellen, keine Entzündungszellen)

03.02.2009



03.02.2009





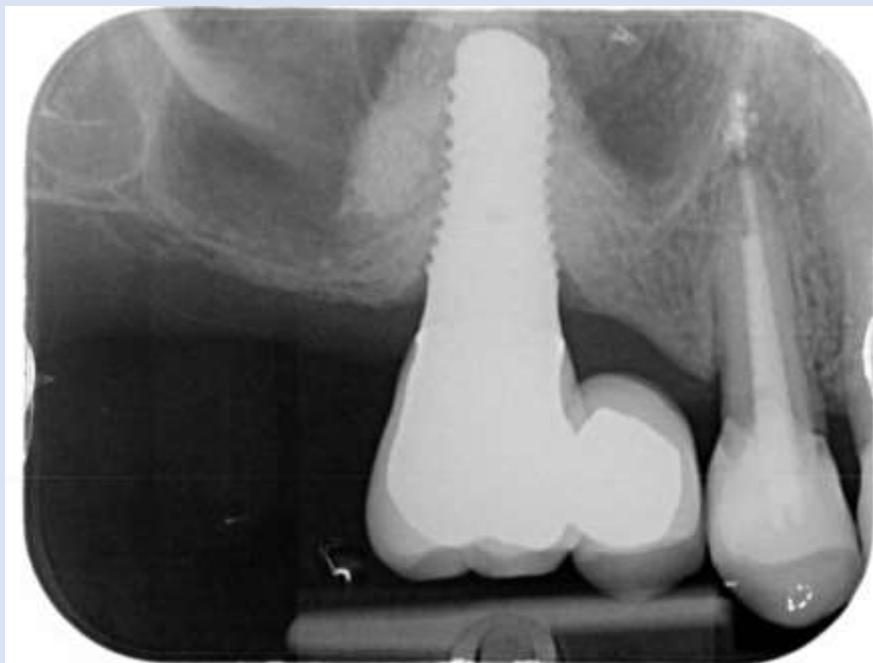
22.03.2010



29.03.2010



1-year postop
23.03.2011



12.02.214



23.03.2011

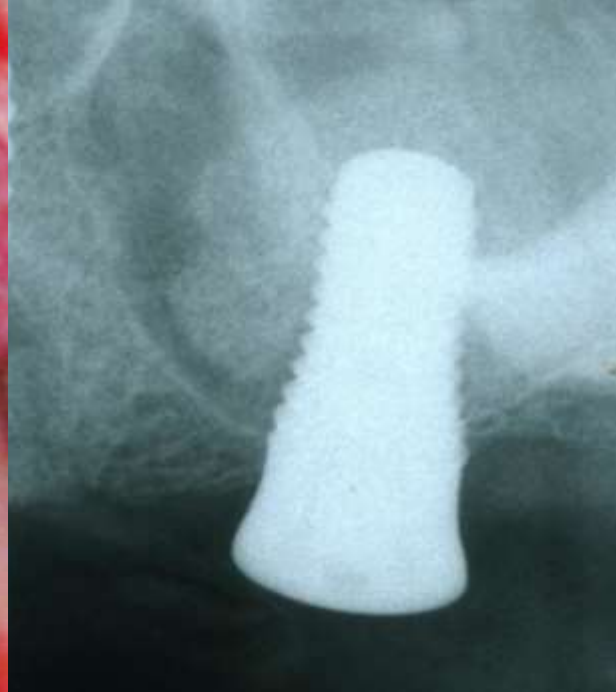


28.10.2016, 6 1/2 years postop



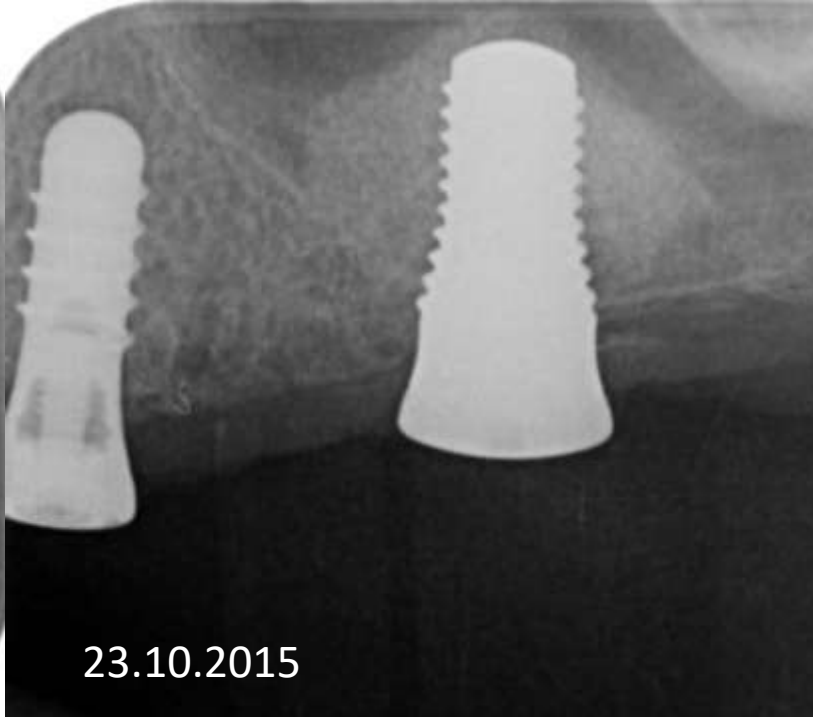


13.02.2008



05.04.2009

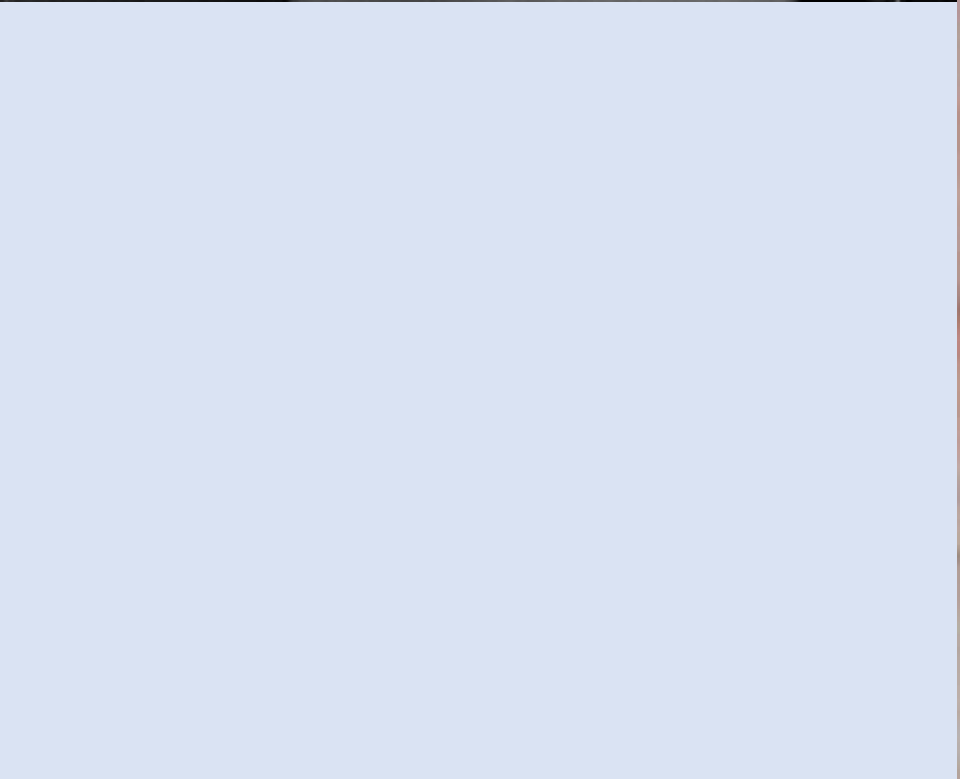




23.10.2015







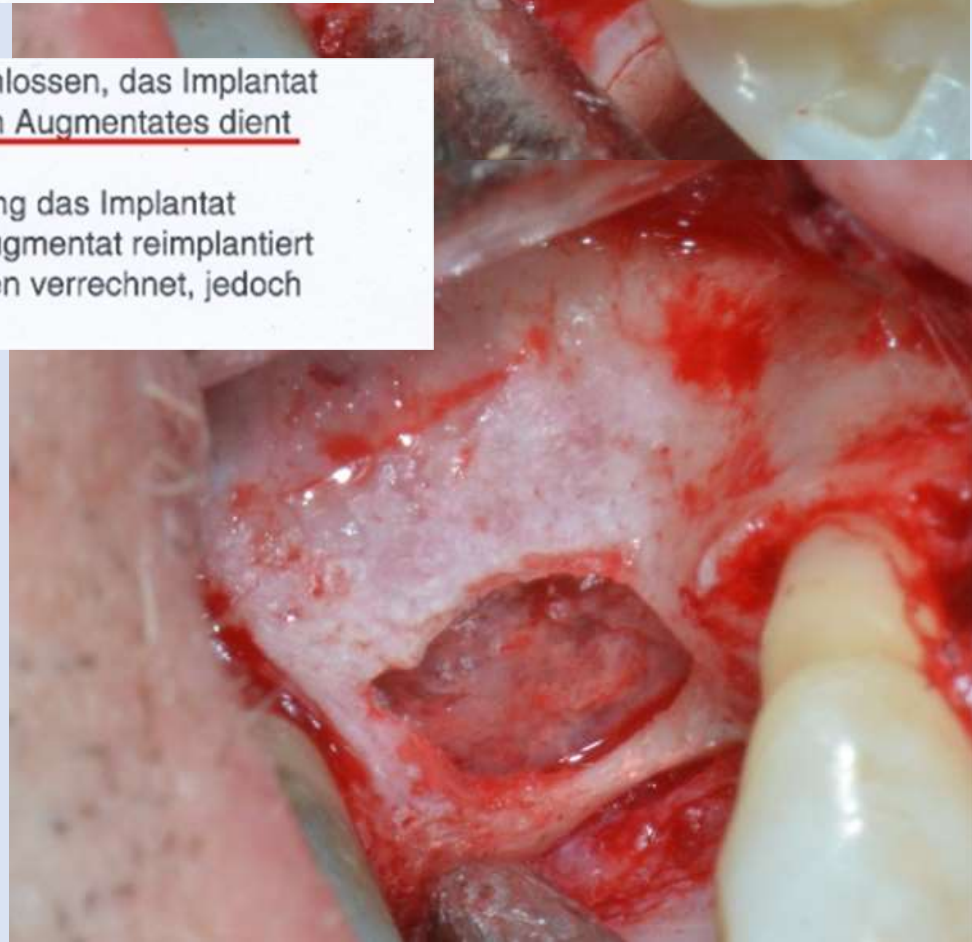
Operation:

16.03.15

Implantation regio 16 (Straumann TE Implantat, Wide-Neck, Lot aufgeklebt). Die Mukosa wird entlang der linea girlandiformis inzidiert, vom Periost abgelöst und zur Gewinnung von mehr attached gingiva vier Millimeter apicalwärts vernäht. Periostschlitzung tief vestibulär für spannungsfreie Lappenadaptation. Von null bis eins auf elf Millimeter Sinusbodenelevation transkanalikulär, Unterfütterung der elevierten Sinusschleimhaut mit BioOss. Buccocrestal Augmentation (Kammverbreiterung, zwei Schraubenwindungen) mit BioOss/BioGide. Grosse Verschlusschraube für transmucosale Einheilung. Perioperative Antibiose mit Co-Amoxi-Mepha 1 g und Chlorhexidinspülung.

Begrenzung zur Sinusschleimhaut fehlte. Ich habe mich entschlossen, das Implantat trotzdem einzubringen, da es mindestens als Stütze des hohen Augmentates dient und evtl. gar einheilt.

Herr Müller ist informiert, dass bei einer feststellbaren Lockerung das Implantat ausgedreht und drei Monate später in das ossifizierte Sinus-Augmentat reimplantiert wird. In diesem Fall wird Herrn Müller ein zweizeitiges Verfahren verrechnet, jedoch ohne Verrechnung der Implantatschraube.



postoperativ



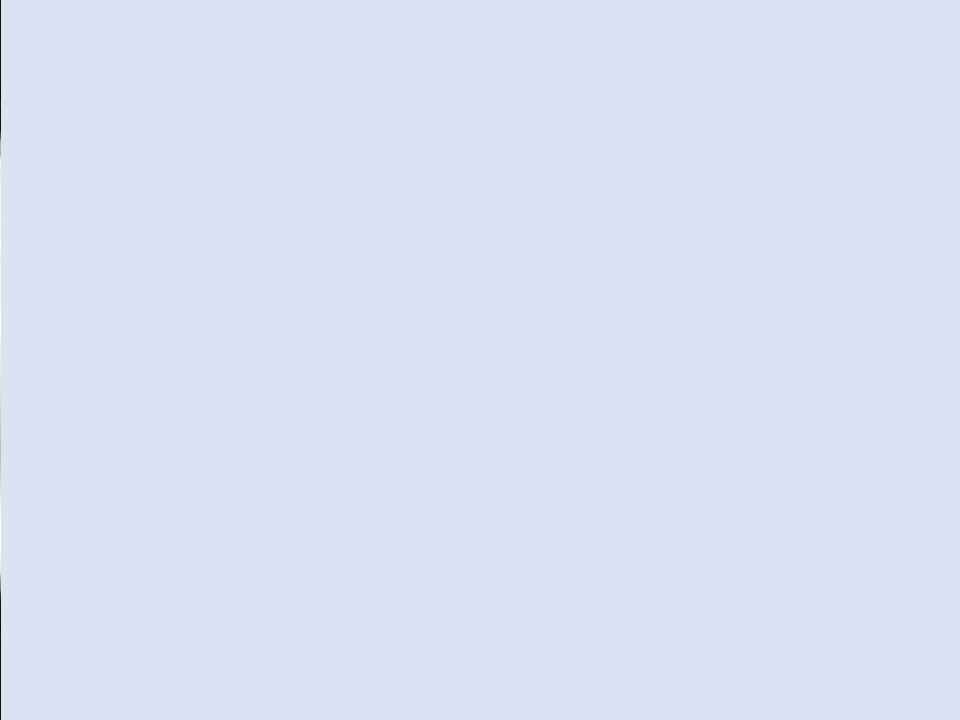
postoperativ



9 Monate postoperativ

















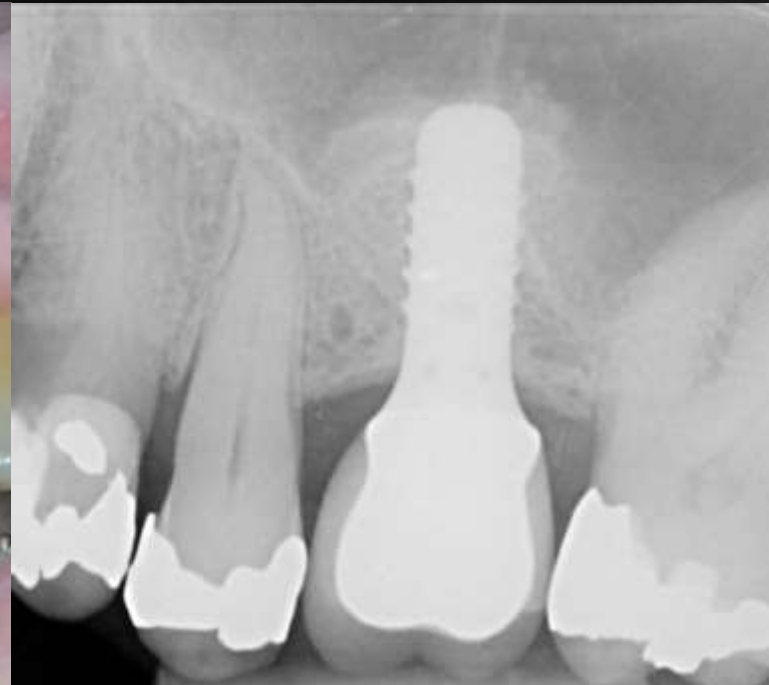
G. Charles, 75-jährig,



29.09.2004



G.Charles, 87-jährig, 03.02.2016



Minimally invasive

from the extraction to the wound closure

The approach with the Benex elevators

Extraction

Soft tissue management

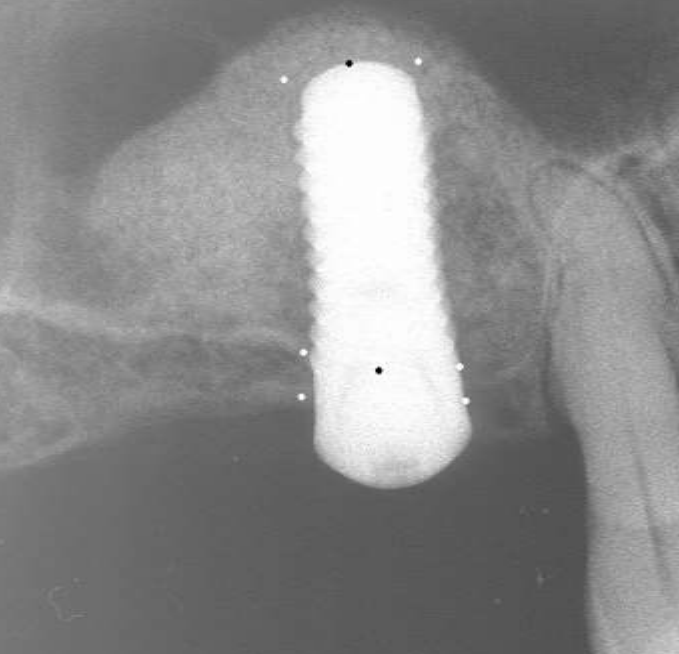
Tips und Tricks

Specialities: Sinus sept
 buccocrestal defect
 little subantral bone height

Ossification / Remodelling of the augmented Sinus

Suprastructure

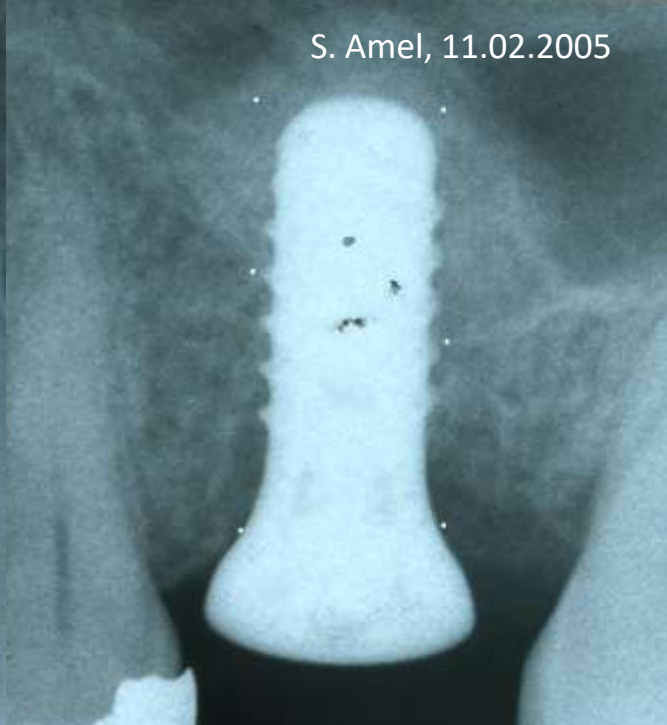
M. Heidi, 30.06.2006



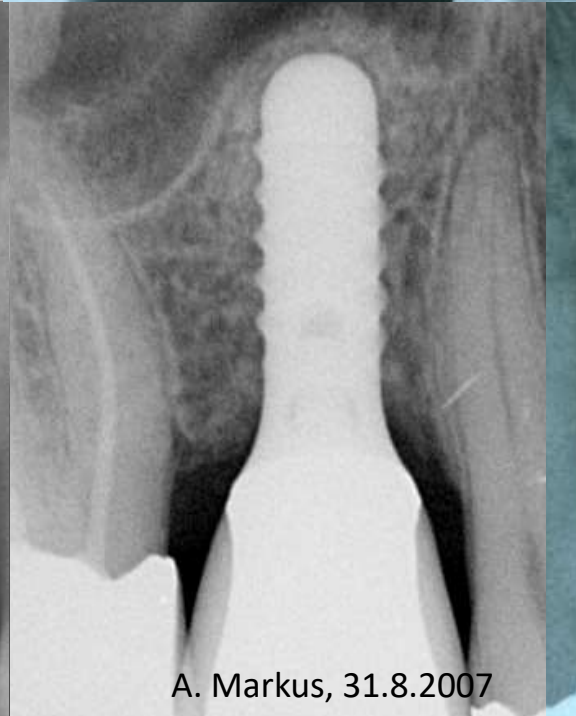
A. Markus, 27.08.2003



S. Amel, 11.02.2005



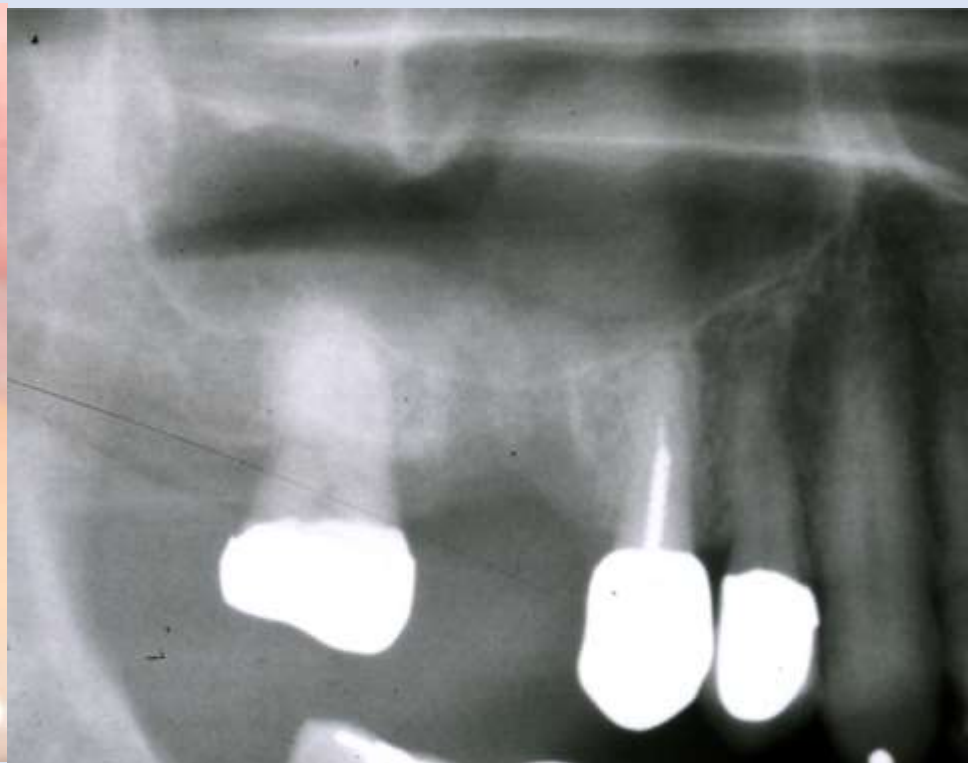
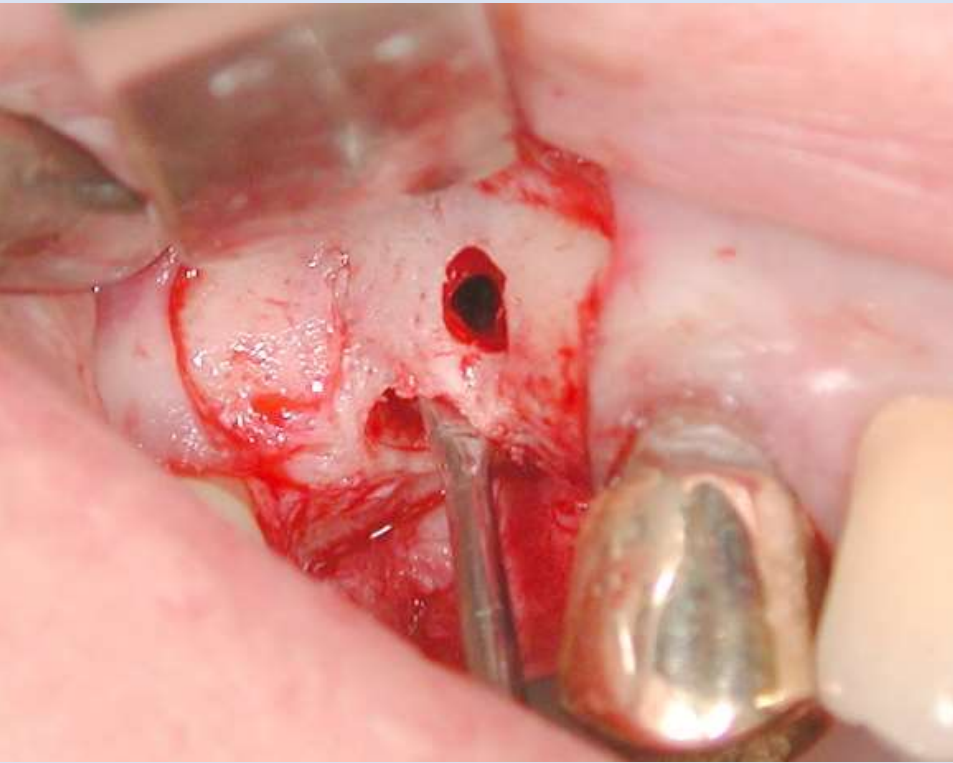
M. Heidi, 06.03.2007



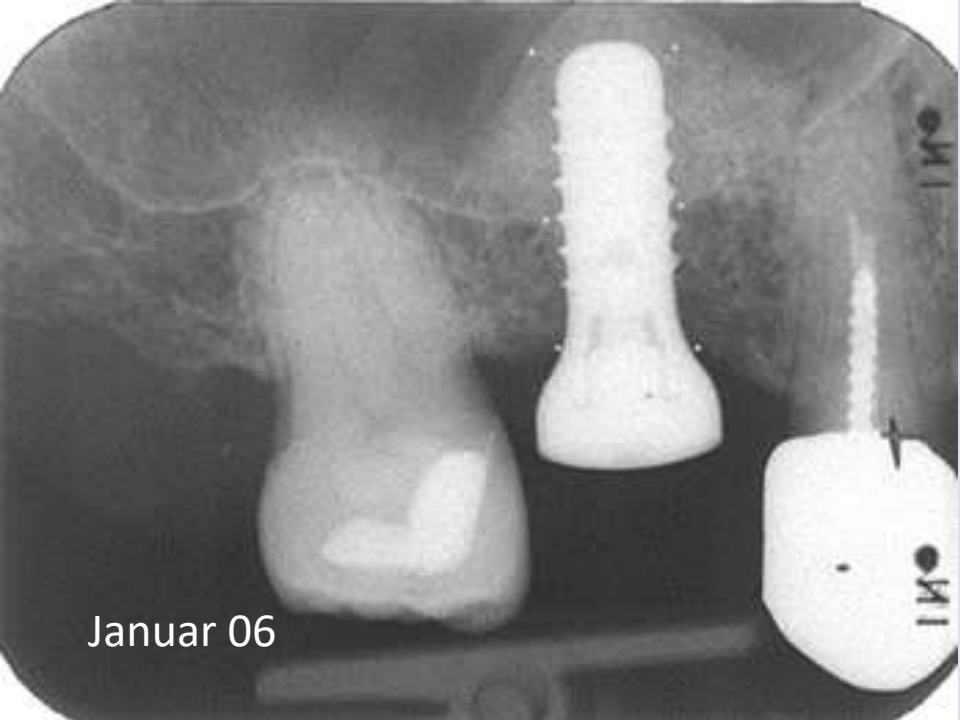
A. Markus, 31.8.2007

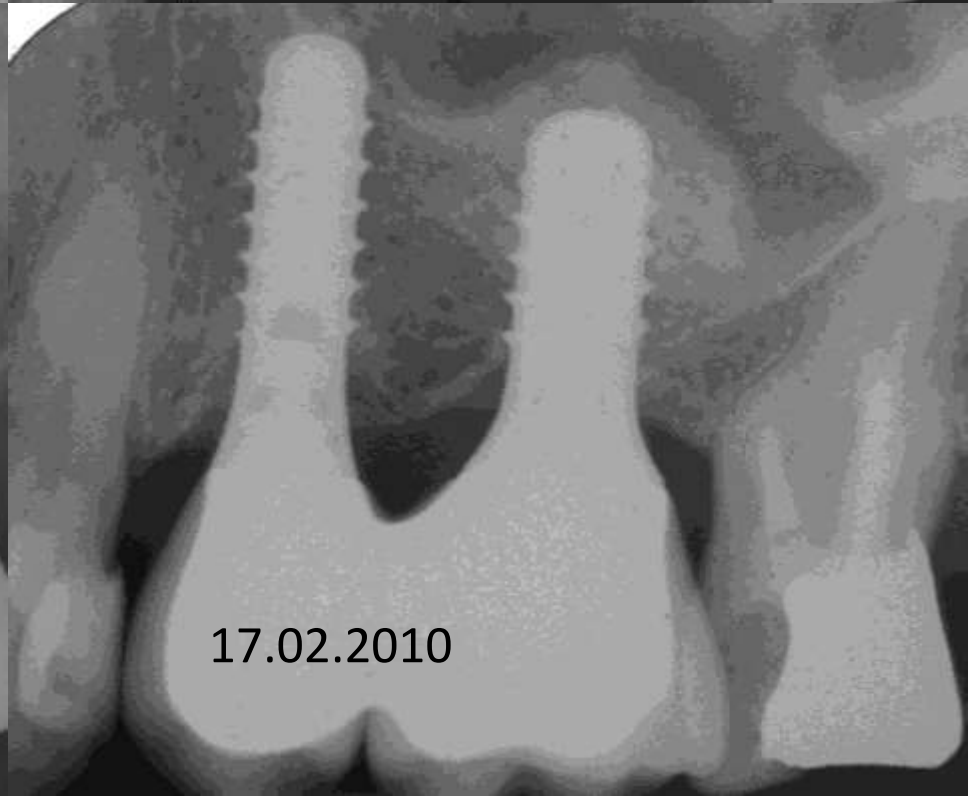


S. Amel, 05.05.2006



Januar 2006





Minimally invasive

from the extraction to the wound closure

The approach with the Benex elevators

Extraction

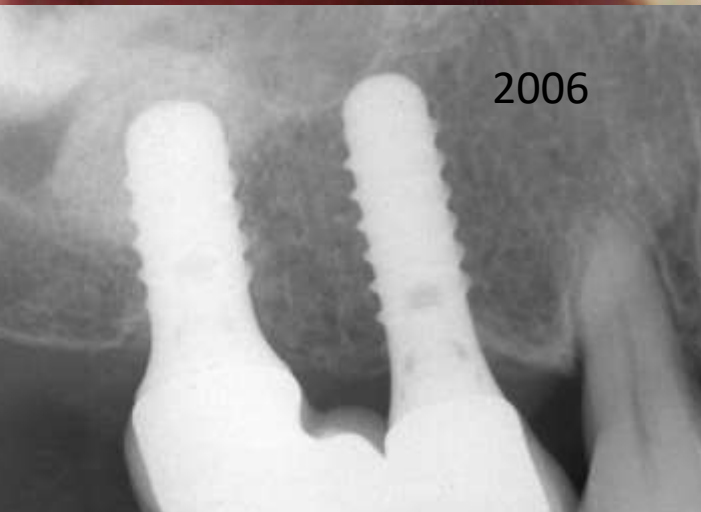
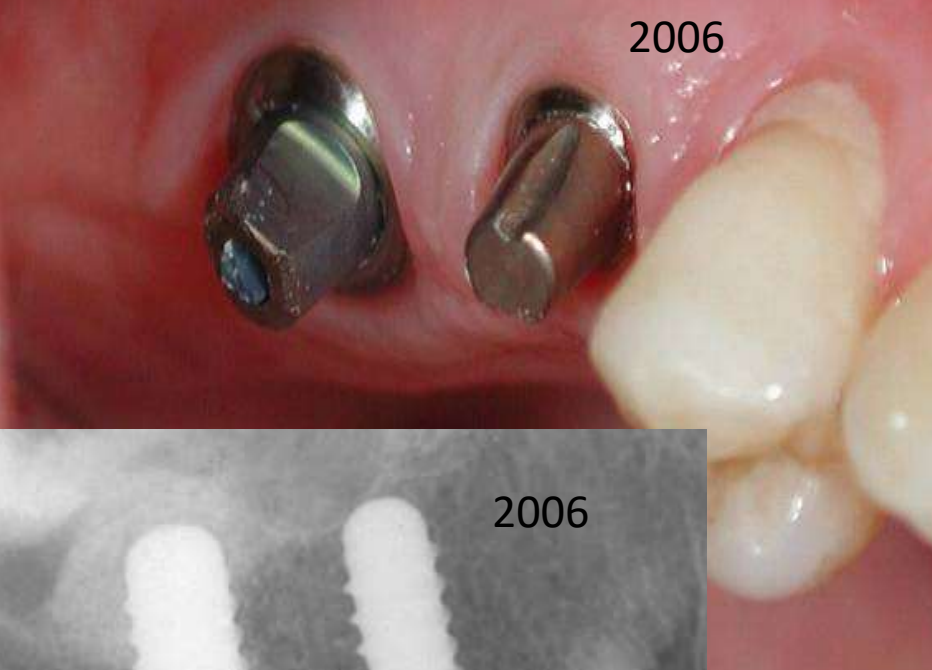
Soft tissue management

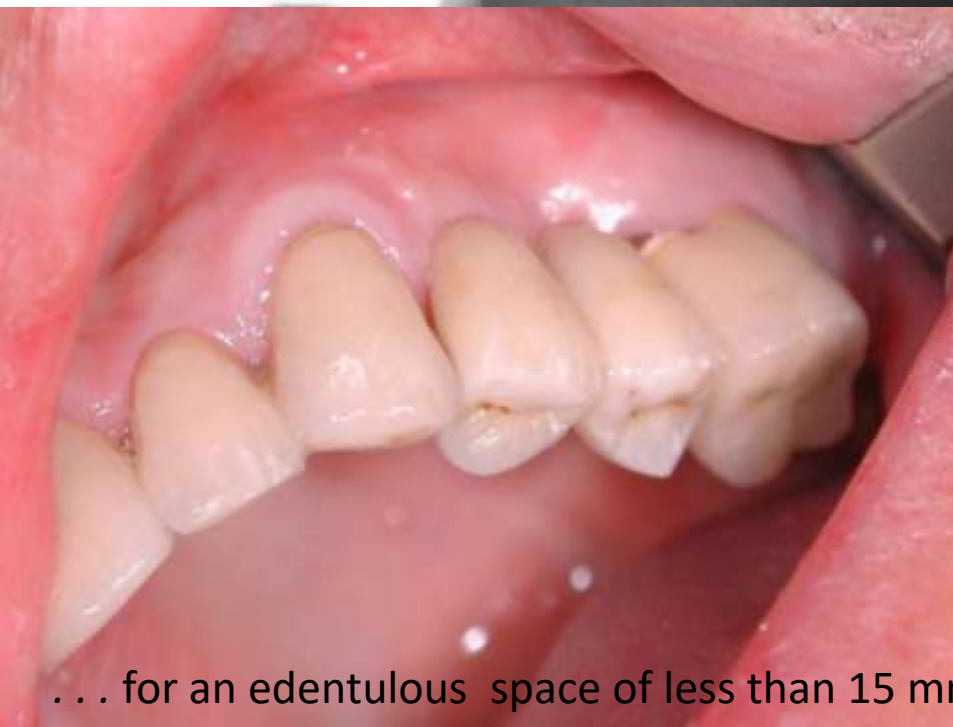
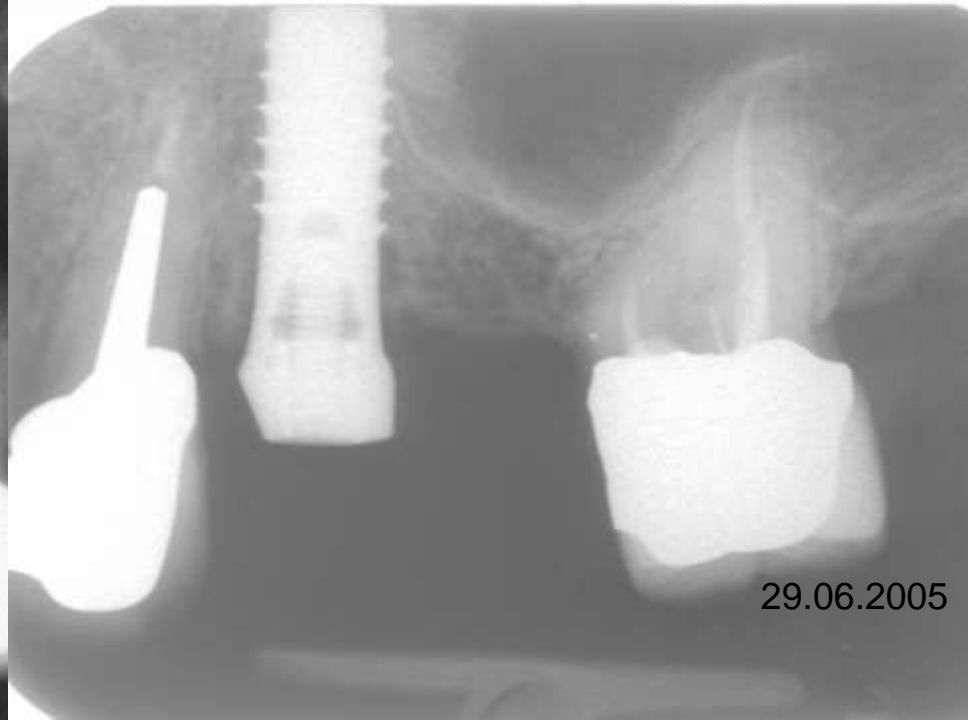
Tips und Tricks

Specialities: Sinus sept
 buccocrestal defect
 little subantral bone height

Ossification / Remodelling of the augmented Sinus

Suprastructure, Exclusivities





... for an edentulous space of less than 15 mm it's done with a cantilever bridge.



Another case

03.06.2008



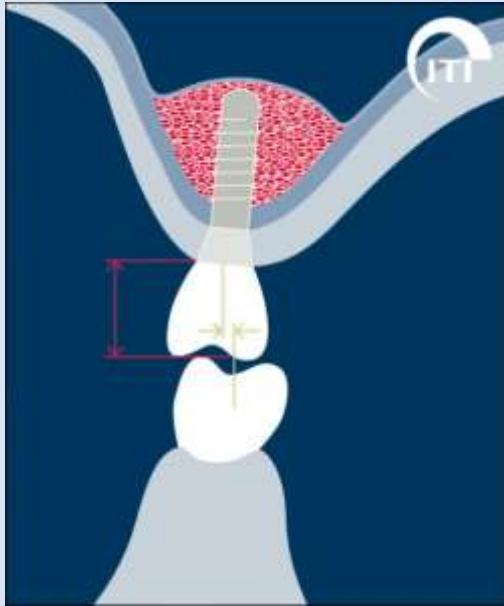
1 year after implantation:
Crown and Cantilever on the left



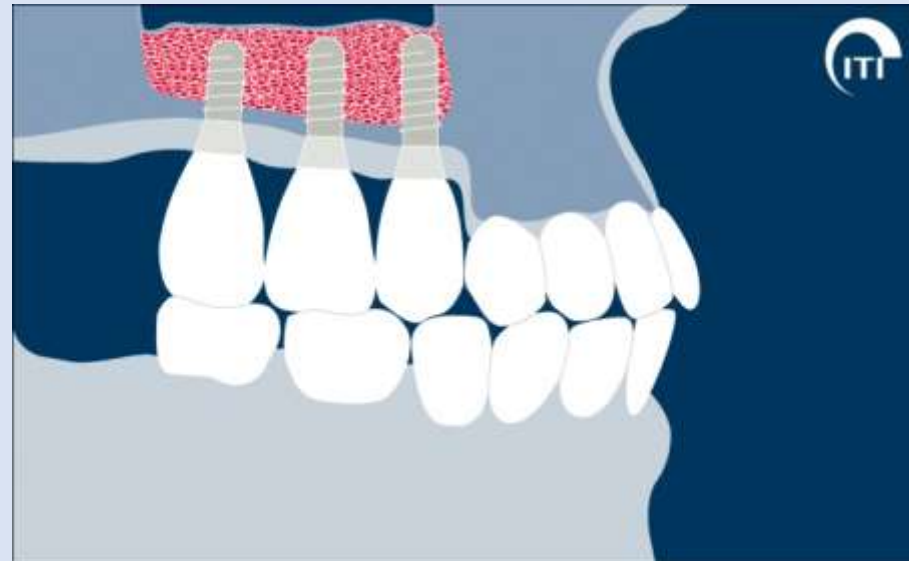
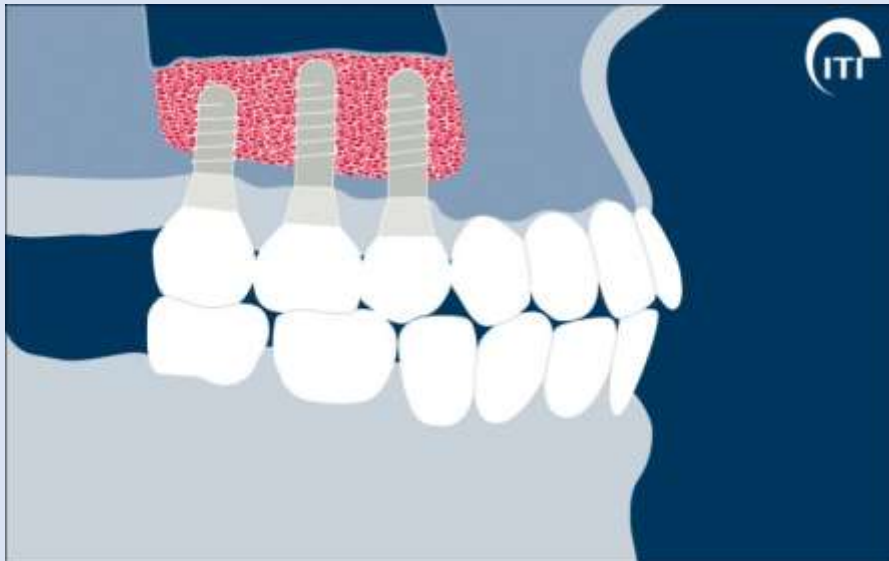
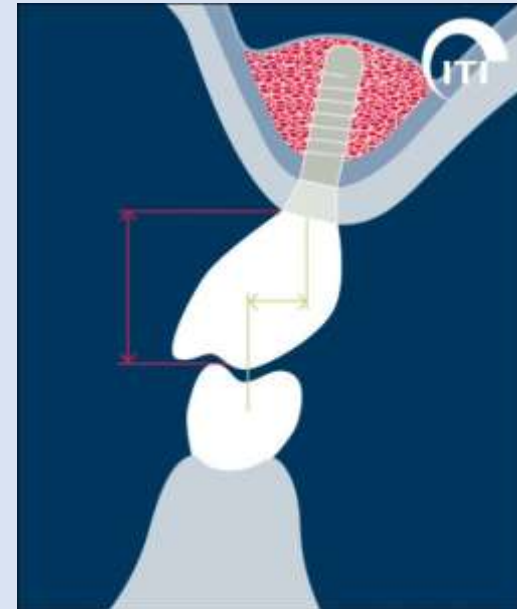
Fixed dental bridge on the right

23.06.2009

Favorable interarch relationship for SFE as the only augmentation procedure



Unfavorable interarch relationship due to vertical and horizontal crestal resorption that may dictate additional three-dimensional site development



Minimally invasive

from the extraction to the wound closure

The approach with the Benex elevators

Extraction

Soft tissue management

Tips und Tricks

Specialities: Sinus sept
 buccocrestal defect
 little subantral bone height

Ossification / Remodelling of the augmented Sinus

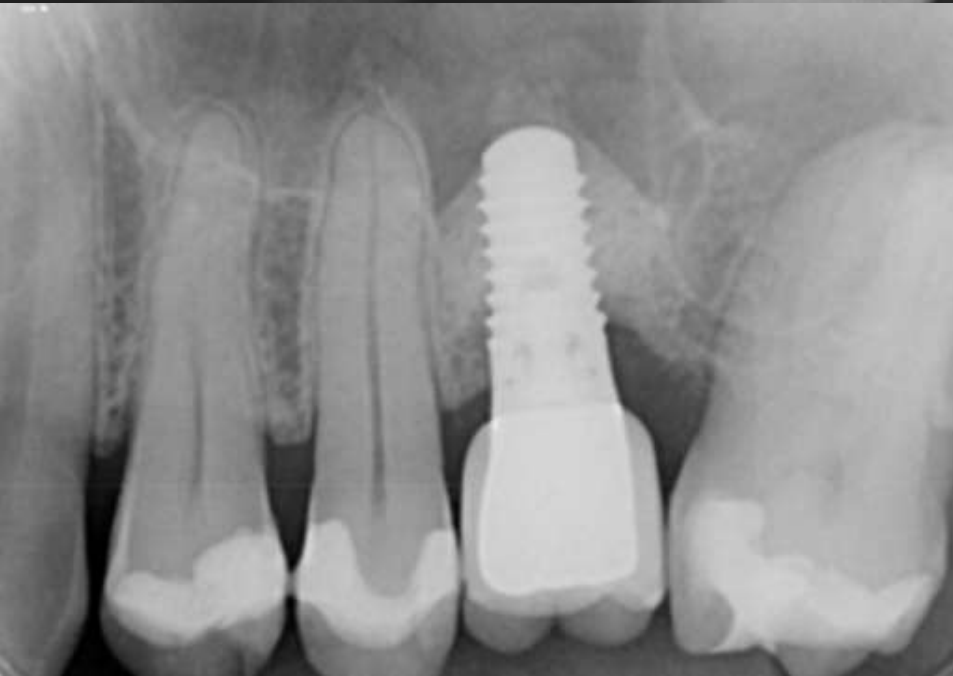
Suprastructure, **Exclusivities**







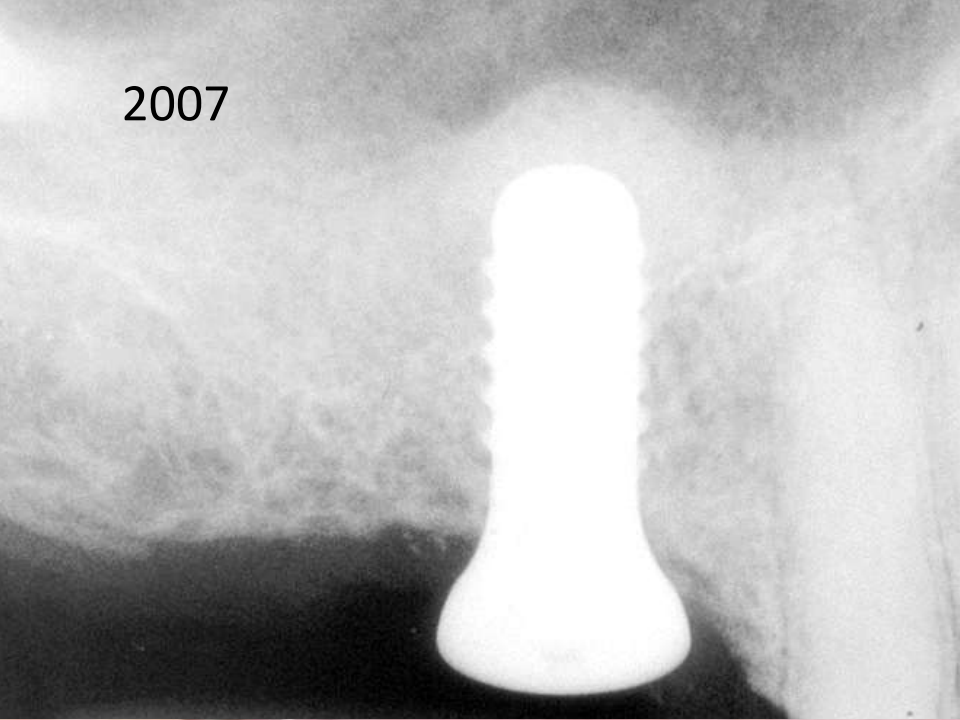
19.10.2012



13.02.2014



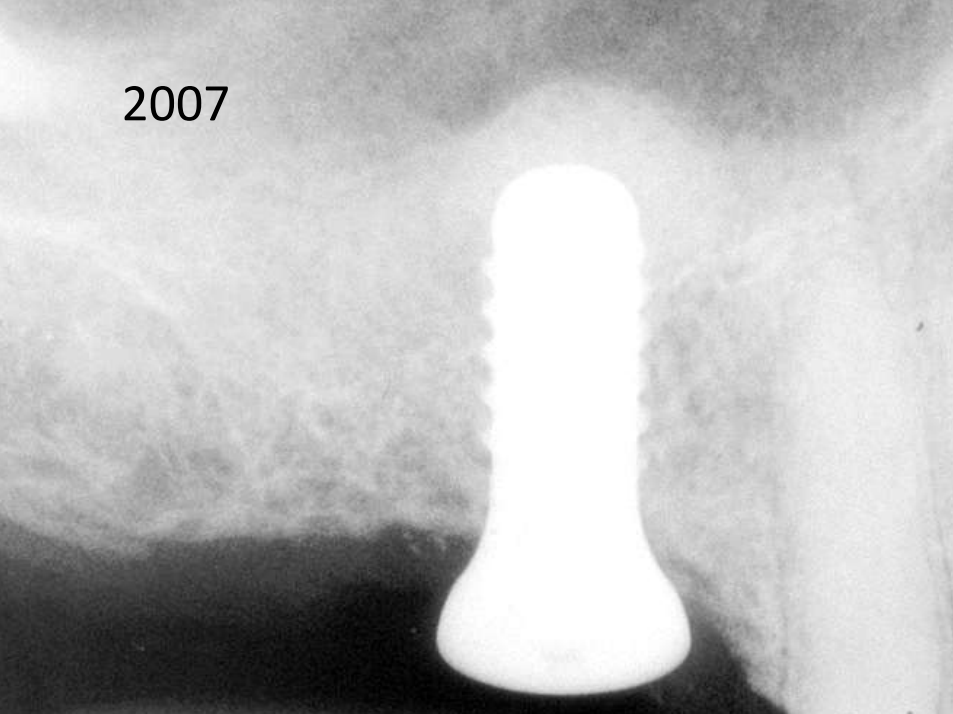
2007



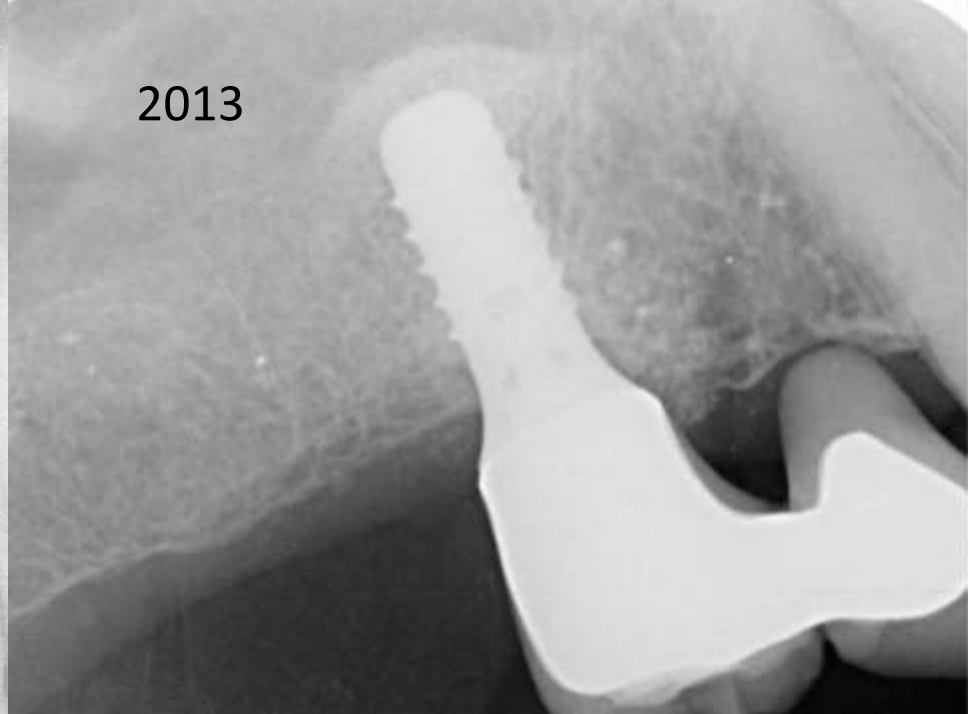
2013



2007

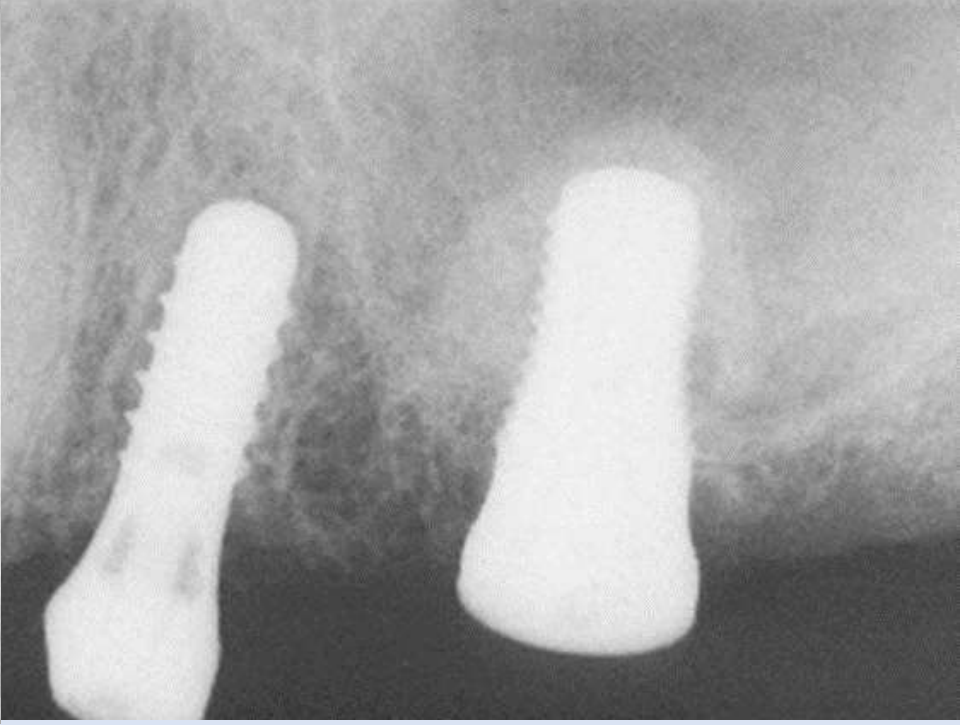
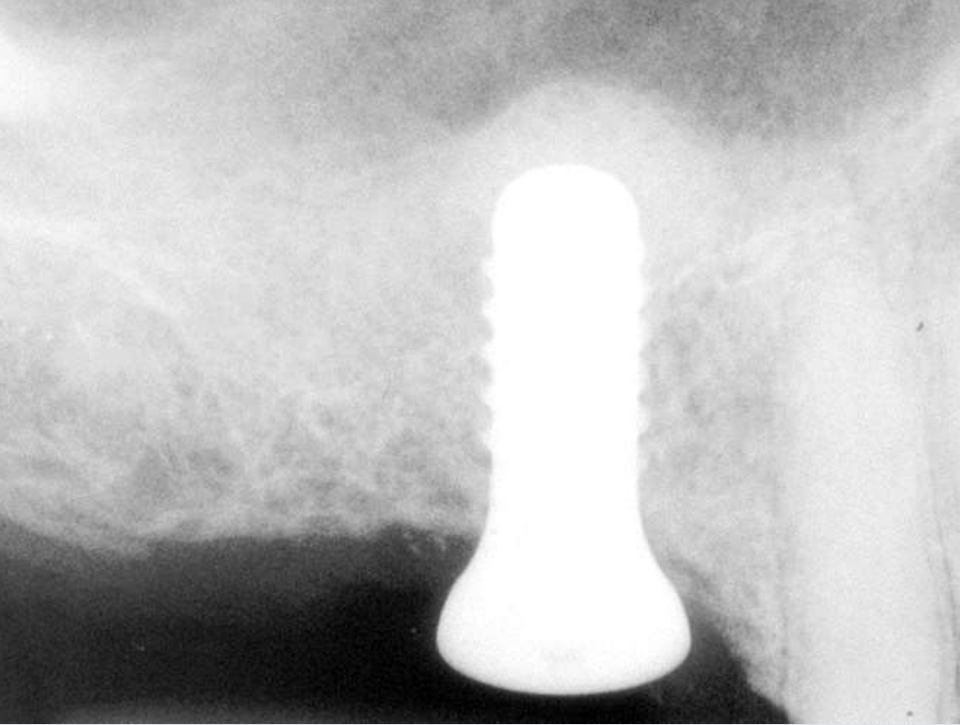


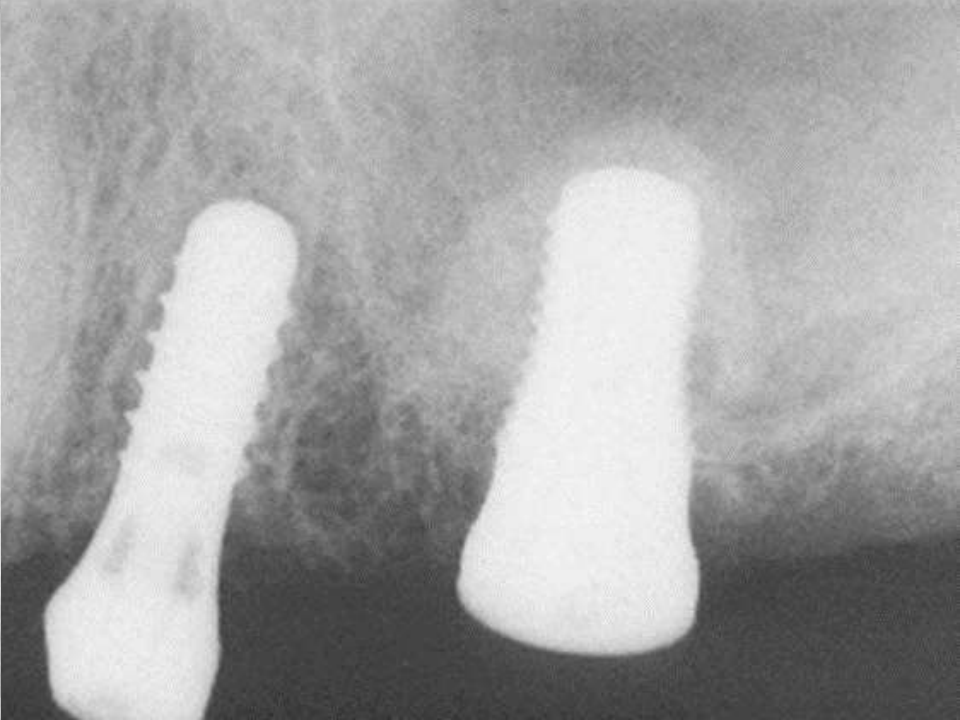
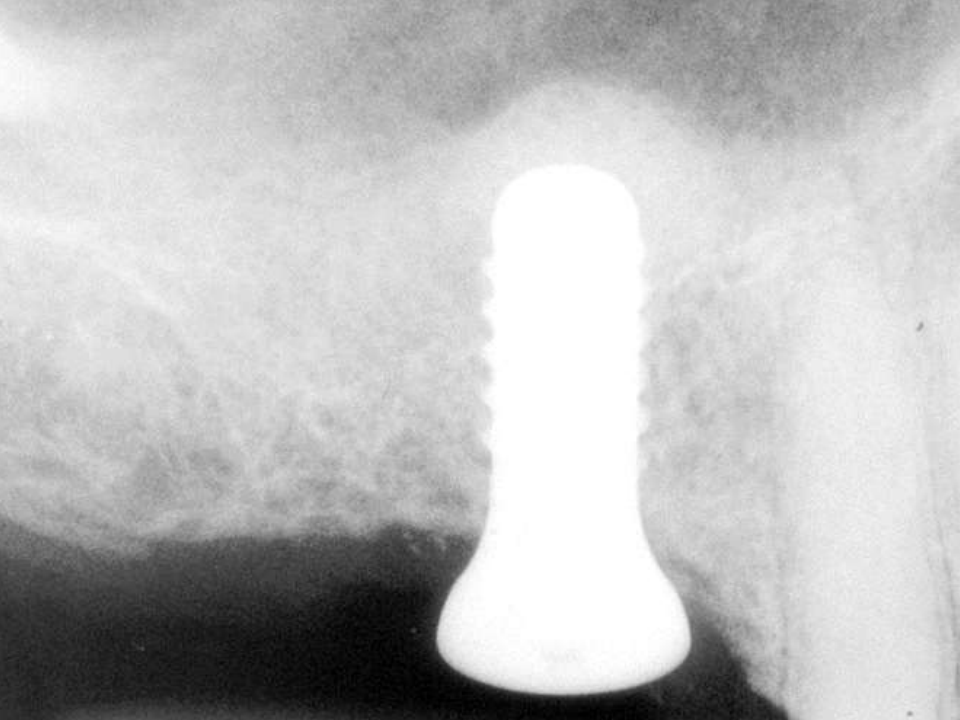
2013



2013





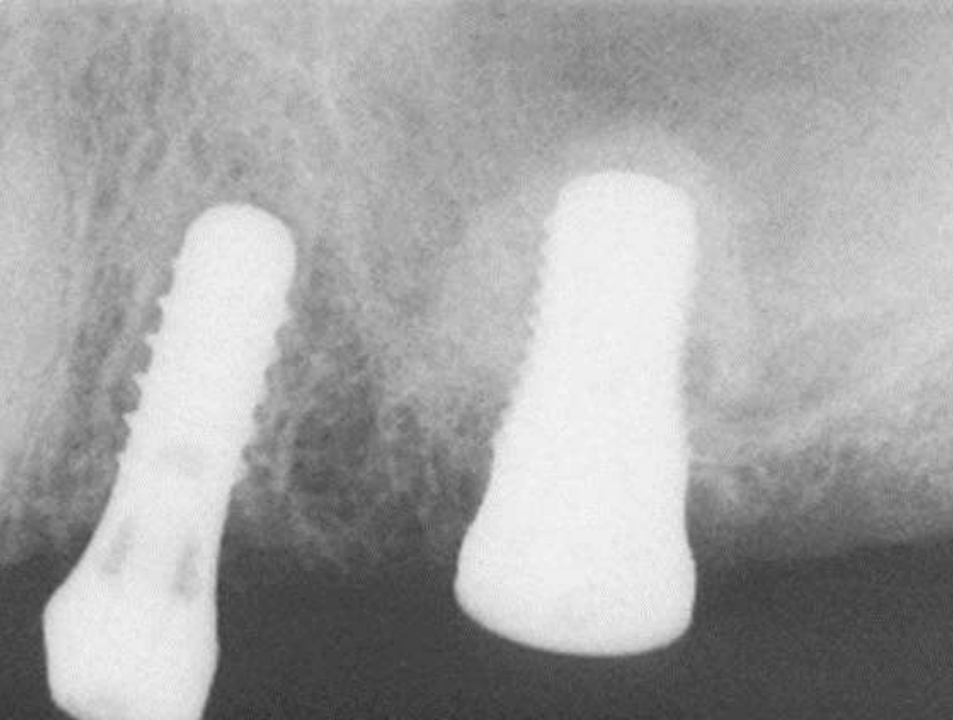


1. Quadrant: R.M. 86-jährig



2. Quadrant: R.M. 92-jährig





15.10.2013



22.10.2013

?

14.02.2014



10.05.2013



24.05.2013



14.02.2014



23.08.2017



Wie geplant (mein Schreiben vom 27.10.12) haben wir mit Frau ~~Schmidig~~ einen Implantationstermin am 10.05.13 vereinbart. Die Röntgenkontrolle vor dem Eingriff zeigte, dass der retinierte Zahn 28 ideal in die Lücke 26 passt.

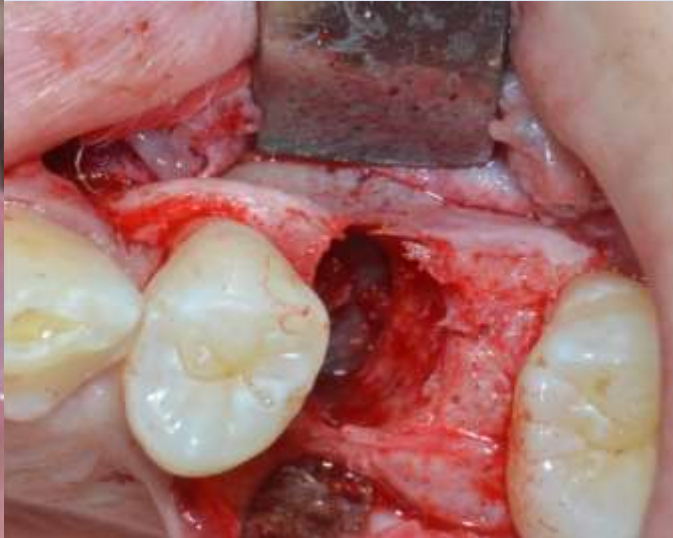
Dein Einverständnis vorausgesetzt und Frau ~~Schmidig~~ war einverstanden, dass der Zahn 28 in die regio 26 transplantiert wird mit gleichzeitigem Sinuslift.

Operation:

10.05.13 Lokalanästhesie. Mucoperiostlappen-Aufklappung von 25 bis Tuber. Sorgfältige Luxation von 28 ohne Berührung der Wurzelteile. Regio 26 Sinusbodenelevation von drei bis fünf auf zehn Millimeter. Der Zugang wird dem Durchmesser der Achterwurzel angepasst, die Sinusschleimhaut mit BioOss unterfüttert, Zahn 28 in die Lücke eingedrückt. Wundverschluss mit Rückstichnähten. Eine weitere Fixation ist nicht notwendig.

24.05.13 Fadenentfernung. Problemloser Heilverlauf.





15.12.2014



28.09.2016





11/2007

12/2007



11/2007

12/2007

11/2011



11/2011

?



11/2007



12/2007



11/2011



11/2011



08/2012



08/2012



11/2007



12/2007



11/2011



11/2011



08/2012



08/2012



05.10.2016





11.05.2009



03.06.2013



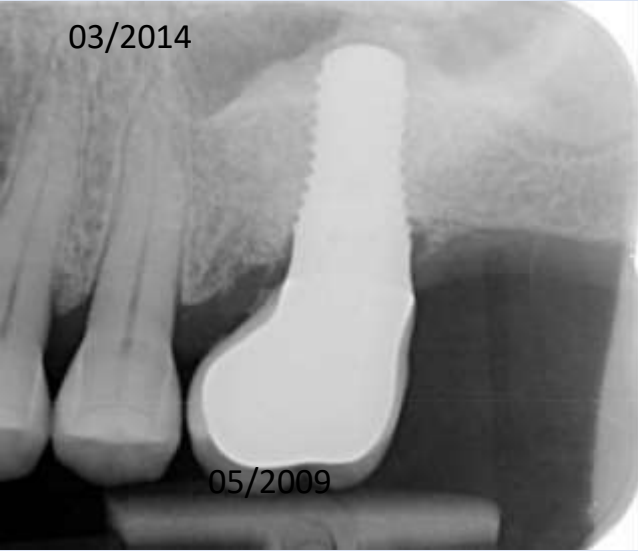


11.05.2009

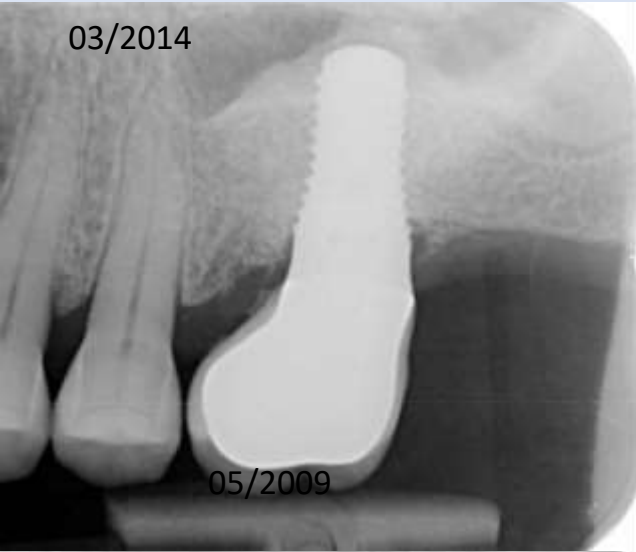


03.06.2013





03/2014



03/2014



10.10.2016











Schleimhautperforations-Test

