Prothèses totales de l’ATM en 2023: un changement de paradigme

Prof. Martin BROOME

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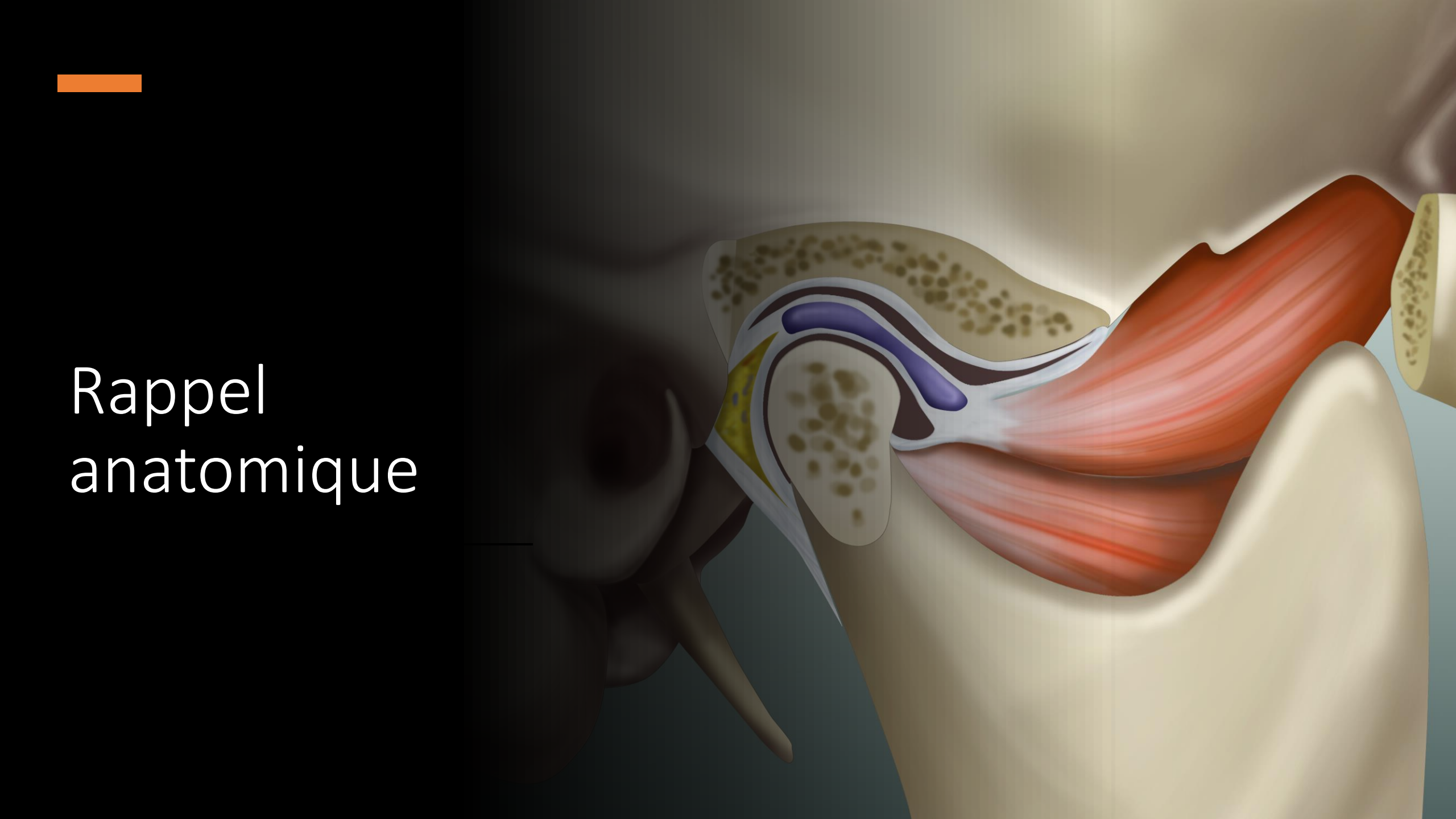
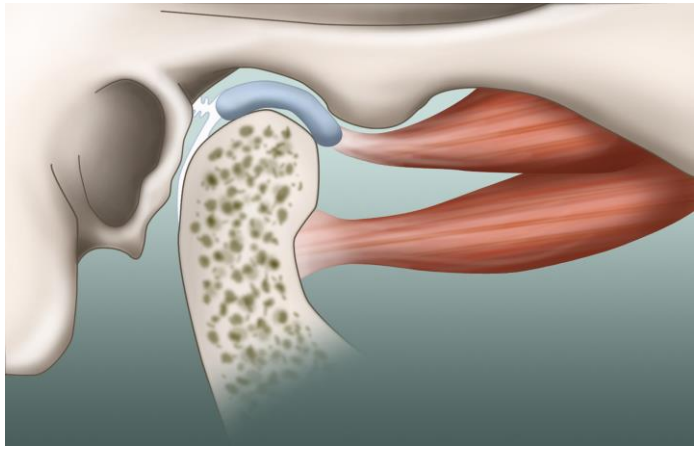
Lausanne, Suisse

SOCIETY FOR DENTAL SCIENCE

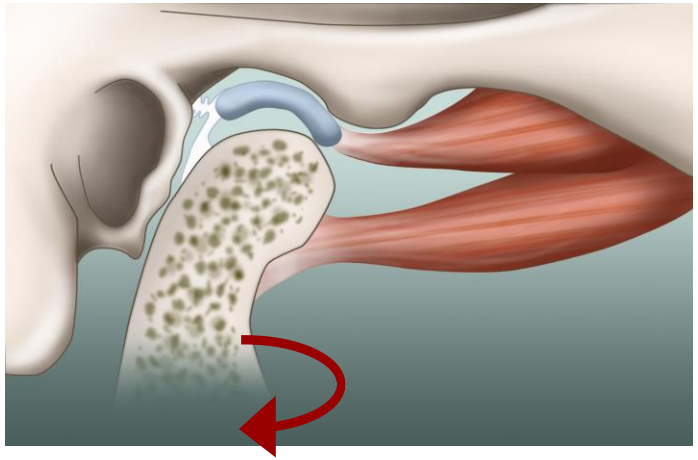
Rappel anatomique



position de repos

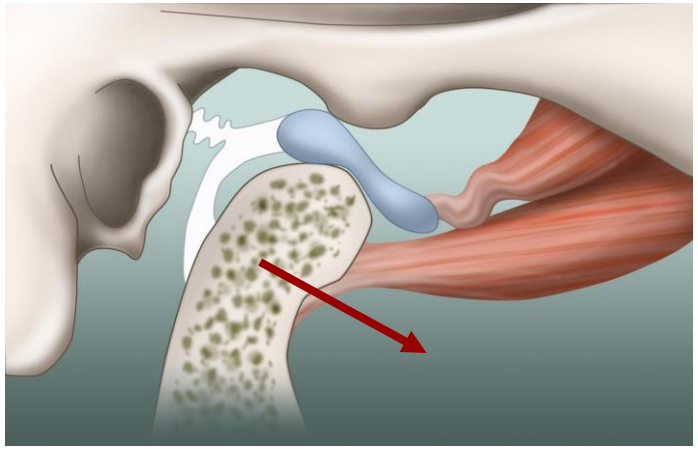


rotation



OB → 20-25 mm

translation



OB → 25 mm

Pathologies générales de l'articulation temporo-mandibulaire (AAOFP, 1994)

Atteintes congénitales ou du développement
- Agénésies
- Hypoplasies
- Hyperplasies (hypercondylies)
- Néoplasies

Pathologies méniscales
- Luxations méniscales réductibles
- Luxations méniscales non-réductibles

Luxations condyliennes

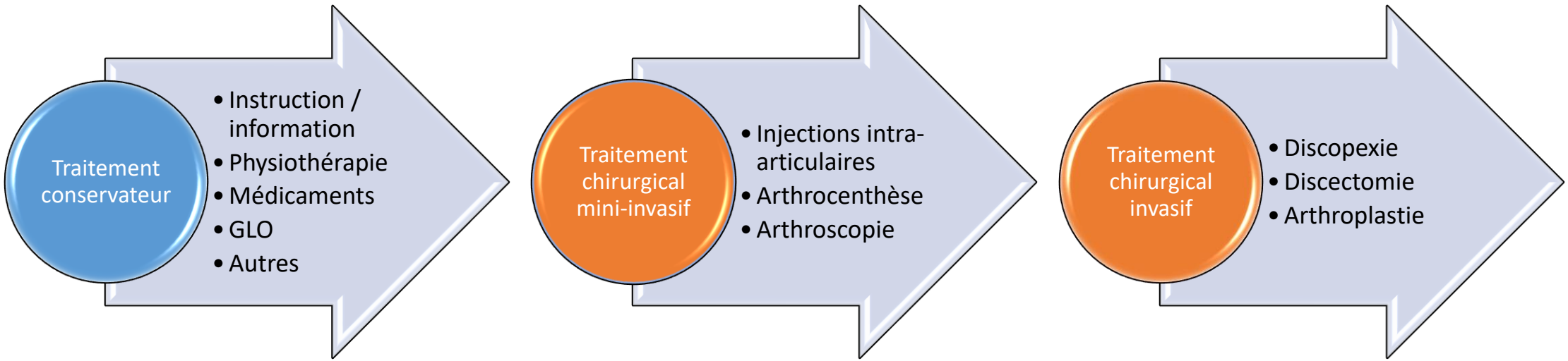
Atteintes inflammatoires
- Capsulites / synovites
- Maladies articulaires systémiques

Arthroses

Ankyloses

Fractures

Prise en Charge



Classification Chirurgicale de Dimitroulis 2013

- Catégorie 1
  - ATM normale
- Catégorie 2
  - Changements mineurs, tous les éléments sont sauvables
- Catégorie 3
  - Modéré: la plupart des éléments sont sauvables
- Catégorie 4
  - Sévère
- Catégorie 5
  - Catastrophique

Int. J. Oral Maxillofac. Surg. 2013; 42: 218–222
http://dx.doi.org/10.1016/j.ijom.2012.11.004, available online at http://www.sciencedirect.com

International Journal of Oral & Maxillofacial Surgery

Research Paper
TMJ Disorders

A new surgical classification for temporomandibular joint disorders

G. Dimitroulis
Maxillofacial Surgery Unit, Department of Surgery, St. Vincent's Hospital Melbourne, The University of Melbourne, Australia

Classification Chirurgicale de Dimitroulis 2013

Catégorie	Clinique	Radiologie	Diagnostic	Traitement
1	Douleurs, pas de bruits, alimentation normale	s/p	Musculaire, contusion	conservateur
2	Dlrs occasionelles , claquement	s/p	Dérangement interne débutant, inflammation	Discussion arthrocenthèse
3	Blocage douloureux	IRM: déplacement discal	LMR	Arthro / pexie Condylotomie
4	Douleurs constantes, crépitations douloureuses, OB limitée	Rx: dégénération IRM: atteinte disque sévère		Chirurgie ouverte
5	Douleurs intolérables avec impotence fonctionnelle	Destruction articulaire	Arthrose terminale, ankylose, tumeur	Résection articulaire prothèse

Journal of Cranio-Maxillo-Facial Surgery 44 (2016) 1988–1995

Contents lists available at ScienceDirect

Journal of Cranio-Maxillo-Facial Surgery

journal homepage: www.jcmfs.com

Temporomandibular joint (TMJ) arthroscopic lysis and lavage: Outcomes and rate of progression to open surgery

Omar Breik*, Vishakha Devrukhkar, George Dimitroulis

Oral and Maxillofacial Surgery Unit, Department of Surgery, St Vincent's Hospital, The University of Melbourne, Melbourne, Australia

Table 6
Comparison of TMJ Surgery classification (Dimitroulis, 2013) with rate of progression to surgery.

Dimitroulis TMJ surgery classification (Dimitroulis, 2013)	Intervention		
	Arthroscopy alone	Surgery	
Category 1	28 100.0% RT 16.7% CT 13.0% GT	0 0.0% RT 0.0% CT 0.0% GT	28 (13.0%)
Category 2	111 97.4% RT 66.1% CT 51.4% GT	3 2.6% RT 6.2% CT 1.4% GT	114 (52.8%)
Category 3	29 90.6% RT 17.3% CT 13.4% GT	3 9.4% RT 6.2% CT 1.4% GT	32 (14.8%)
Category 4	0 0.0% RT 0.0% CT 0.0% GT	33 100.0% RT 68.7% CT 15.3% GT	33 (15.3%)
Category 5	0 0.0% RT 0.0% CT 0.0% GT	9 100.0% RT 18.8% CT 4.2% GT	9 (4.2%)
	168 (77.8%)	48 (22.2%)	216

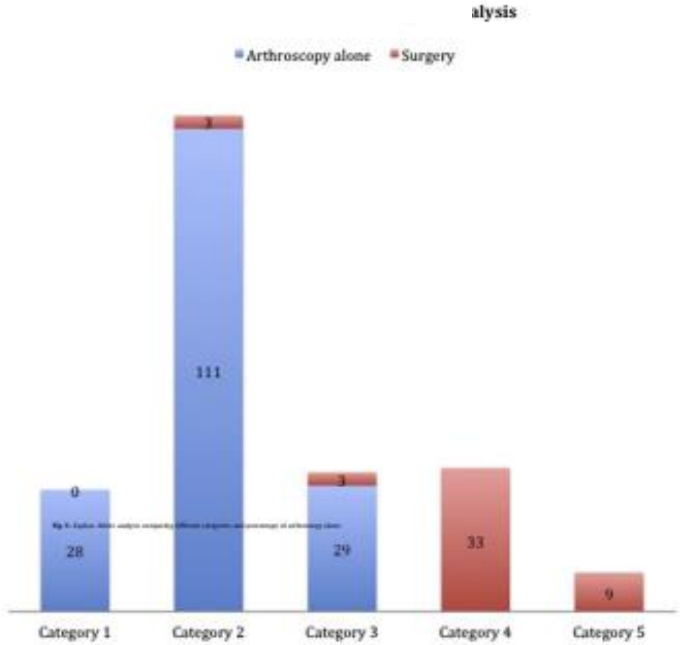


Fig. 4. Graph showing rates of arthroscopy alone and progression to surgery with TMJ Surgery classification at time of arthroscopy.

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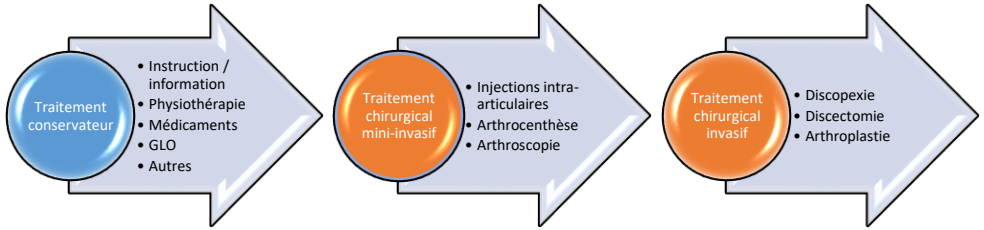

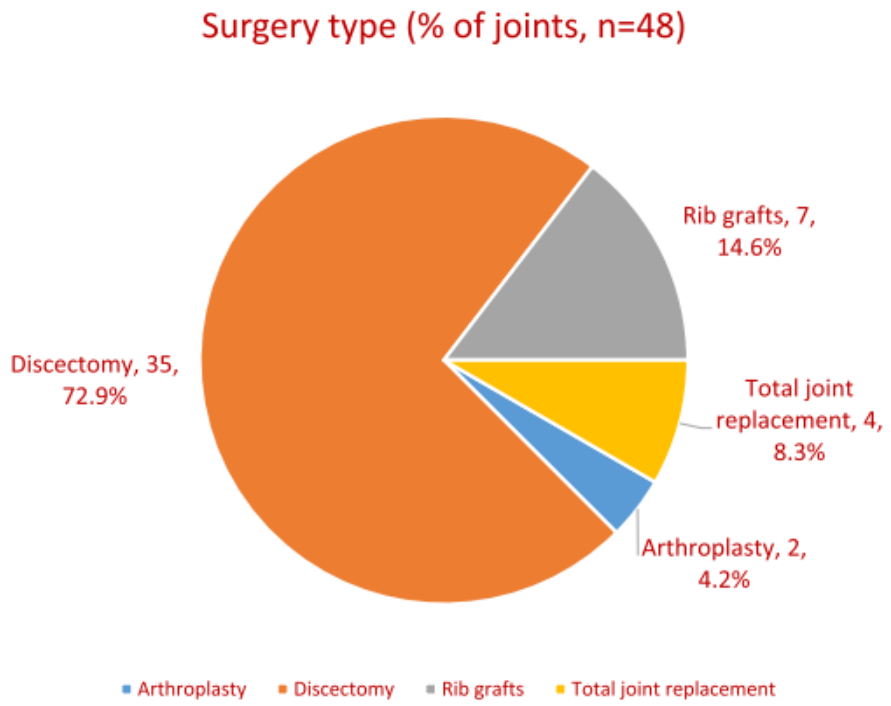

Fig. 6. Pie chart showing type of surgery offered in patients post arthroscopy (% of joints, n = 48).

J Oral Maxillofac Surg. 2021 July ; 79(7): 1423–1433. doi:10.1016/j.joms.2021.01.002.

An International Survey on TMJ Surgeon's Implementation and Management of Discectomy in Treating TMJ Internal Derangement

Douglas F. Werkman, M.S. [Clinical Research Master's Student],
University of Michigan School of Dentistry

- 40% arthrose
- 50 % bruits

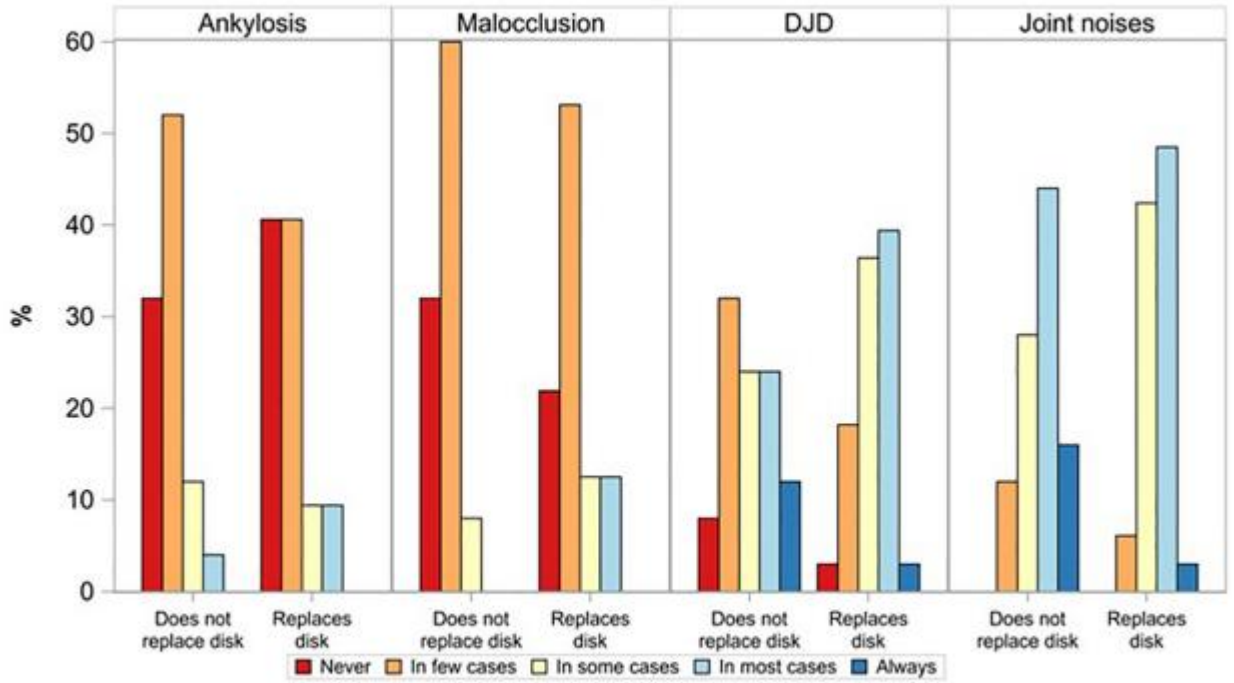

Figure 2. Responses to "Please indicate how often you have experienced the following adverse effects of TMJ discectomy" stratified by tendency to replace the disc.
Ankylosis p=0.75; malocclusion p=0.12; DJD p=0.41; Joint noises p=0.42.

Changement paradigme ?

- Qu’est-ce qu’on fait avec les cas sévères, les réankyloses, les douleurs non contrôlées?

- Qu’est-ce qui a changé 2023?

pagepress

Orthopedic Reviews 2021; volume 13:8773

Historical overview of hip arthroplasty: From humble beginnings to a high-tech future

Nicolae Ciprian B
Sergiu Caterev, A
Department of Or
Traumatology and
Orthopedics, "Iul
University of Med
Cluj-Napoca, Ron

archeologists who found signs of this pathology in *Homo Neanderthalensis* skeletons.[1,2] Also, skeletons from ancient Britain and medieval times[3,4] were found with signs of hip arthritis. In those times, the orthopedic treatment was the only one available,

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E-mail: dan88nistor@yahoo.com

asty, direct ante-
t, history, histor-

and AT were
and the design
tributed in data
preparation. All

Surgery of the arthritic hip was not an easy task in the previous centuries, lots of operations being followed very closely by complications and failures. Nowadays, hip arthroplasty is considered "the operation of the century". This review follows the evolu-

La pratique de la chirurgie orthopédique moderne est **impensable** sans matériaux alloplastiques

Sir John Charnley

1911 - 1982

Pourquoi est-ce qu’on a du attendre 60 ans ?

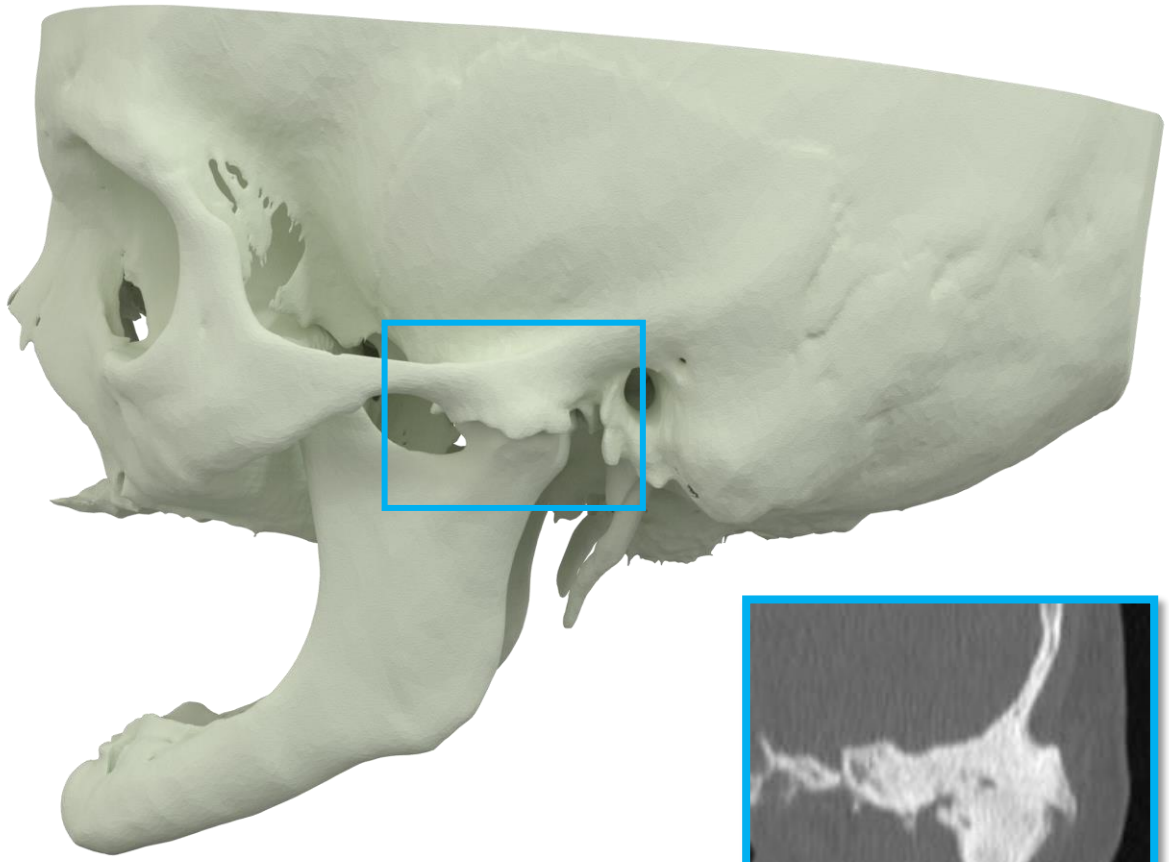
- Pertinence des objectifs
- Principalement en raison des échecs
- Avancées technologiques
  - Imagerie
  - Ingénierie
  - Chirurgicales

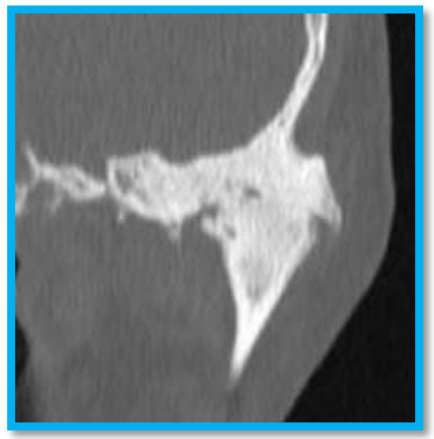
G. Klimt, la médecine, détruite en 1945

Prothèse ATM

Objectifs

- Amélioration fonction - forme
- Diminution douleurs
- Contenir traitements excessifs
- Contenir coûts supplémentaires
- Limiter morbidités successives



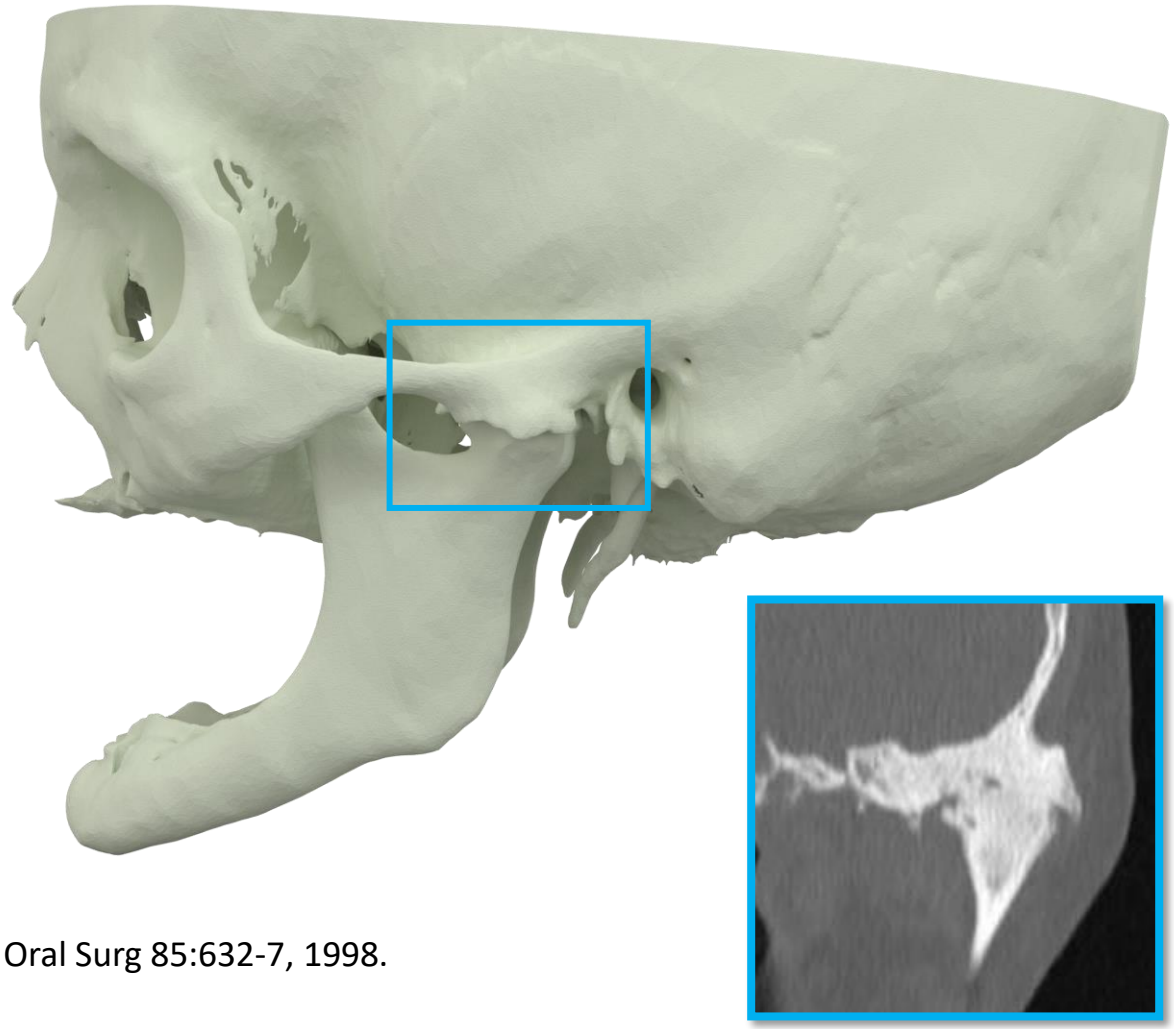


Mercuri LG. Alloplastic TMJ Reconstruction. Oral Surg 85:632-7, 1998.

Prothèse ATM

Objectifs

- **Amélioration fonction - forme**
- Diminution douleurs
- Contenir traitements excessifs
- Contenir coûts supplémentaires
- Limiter morbidités successives



Mercuri LG. Alloplastic TMJ Reconstruction. Oral Surg 85:632-7, 1998.

Prothèse ATM

Objectifs

AVANTAGES

- Disponible
- Pas de site donneur
- S’adapte à n’importe quelle anatomie
- Non sensible aux atteintes inflammatoires
- Alimentation rapide

DÉSAVANTAGES

- Coûts
- Matériaux
- Usure
- Longévité
- Fin de croissance ?

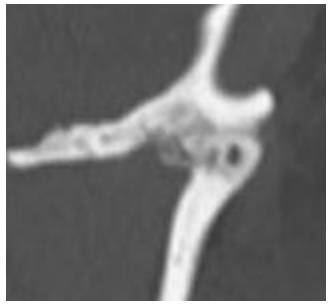
Prothèse ATM

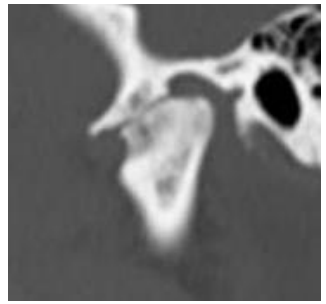
Objectifs

Avantages - Désavantages

Indications:

- Arthrose
- Arthrite inflammatoire
- Ankylose fibreuse ou osseuse
- Echec précédent
- Perte hauteur (trauma, tumeur, malformation)





Mercuri LG (Ed). Temporomandibular Joint Total Joint Replacement – TMJ TJR – A Comprehensive Reference for Researchers, Material Scientists and Surgeons. Springer International Publishing. New York. 2016.

Prothèse ATM

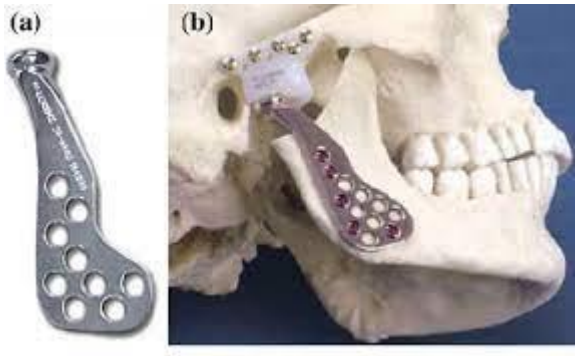
- Objectifs
- Avantages - Désavantages
- Indications
- Contre-indications relatives

- Maladie systémique non contrôlée
- Troubles psychiatriques
- Parafonctions
- Infections locales
- Hypersensibilité documentée
- Âge ?

Mercuri LG (Ed). Temporomandibular Joint Total Joint Replacement – TMJ TJR – A Comprehensive Reference for Researchers, Material Scientists and Surgeons. Springer International Publishing. New York. 2016.

Prothèse ATM

- Objectifs
- Avantages - Désavantages
- Indications
- Contre-indications relatives
- 2 types:
  - standard (stock)
  - sur mesure (custom)



Résultats

Custom vs Stock TMJR
A Systematic Review

Résultats:

- Amélioration ouverture bouche 2 systèmes
- Diminution douleurs 2 systèmes
- Amélioration scores alimentaires

Conclusions:

- **Sur mesure plus souvent utilisé dans les cas avancés**
- **Sur mesure amène nombreux avantages chirurgicaux et patients**

De Meurechy NKG, et al. Total Temporomandibular Joint Replacement: Stick to Stock or Optimization by Customization? Craniomaxillofacial Trauma & Reconstruction 13:1-12, 2020.

Résultats

Prothèses ATM 1995 - 2020

Year	Journal	First Author	N cases	F/U	Subjective Results	Objective Results	QoL Results
2020	BJOMS	Gupta	36	36 mo	Improved	Improved	91.7%
2018	AOMS	Desai	23	12 mo	Improved	Improved	Improved
2017	JCMFS	Gerbino	55	12 mo	Improved	Improved	Improved
2016	BJOMS	Kunjur	18	30 mo	Improved	Improved	Better
2016	IJOMS	Wojazynska	15		53% hadchronic pain	67% < function	High
2016	IJOMS	Gonzalez	52	2 yrs	p<.001 improvement	p<.001 improvement	
2016	JOMS	Alakailly	36	12 mo			94%
2015	BJOMS	Gruber	58	3 yrs	p<.0001 improvement	p<.001 improvement	
2015	JOMS	Wolford	56	20 yrs	p<.001 improvement	p<.001 improvement	85%
2014	BJOMS	Idle	402	12 yrs	Improved	Improved	
2014	IJOMS	Aagaard	61	3 yrs	p<0.0005 improvement	p<0.0005 improvement	
2014	IJOMS	Sanovich	62	6-83 mos	p<0.01 improvement	p<0.01 improvement	
2014	IJOMS	Murdoch	42	43 mo	p<.001 improvement	p<0.01 improvement	90%
2014	JOMS	Burgess	72	46.3 mo	p<.0001 improvement	p<.0001 improvement	p<.0001 improvement
2013	IJOMS	Leandro	300	3.5 yrs	Improvement	Improvement	
2013	CMFTR	Briceño	27	5 yrs	p < 0.05 improvement	p < 0.05 improvement	44.4%
2012	IJOMS	Machon	27	24 mo	Significant improvement	Significant improvement	
2012	J CMF Surg	Schuurhuis	8	8 yrs	p=0.027		
2012	BJOMS	Kanatas	31	12 mo	Improved	Improved	
2012	JOMS	Giannakop	228	10 yrs	p<.0001 improvement	p<.0001 improvement	46%
2011	Aust Dent J	Jones	7	6 mo - 3 yrs	Improved	Improved	
2010	IJOMS	Westermark	12	2 - 8 Yrs	Improvement	Improvement	
2007	JOMS	Mercuri	61	10 yrs	p<.001 improvement	74% > MIO	86%
2003	IJOMS	Wolford	42	5 - 8 yrs	P=0.0001	P=0.001	
2002	JOMS	Mercuri	60	107.4 mos	P=0.0001	30% improvement	87%
1999	JOMS	Mercuri	215	30.7 mo	Group 1 = 0 to 2 sxs = 61.3% improvement	group 3 = > increase in MIO, other groups had less improvement.	86%
1998	Surg Tech	Lippincott	25	26 mo	significant improvement	significant improvement	
1997	Surg Tech	Garrett	20	25 mo	65% < pain	60% > MIO	
1995	JOMS	Mercuri	215	4 yrs	p<.0001 improvement	p<.0001 improvement	

29 papiers, 2266 cas, F/U 61 m, Amélioration QoL = 79%

Résultats

Patient Satisfaction

The use of alloplastic total joint replacement prostheses are viable, and present favorable outcomes for both patients and clinicians alike.

"...it should become apparent that the phobia surrounding their use is not warranted."

Desai J. Patient Perception following Alloplastic Total Temporomandibular Joint Replacement. Ann Maxillofac Surg 8: 83–5, 2018.

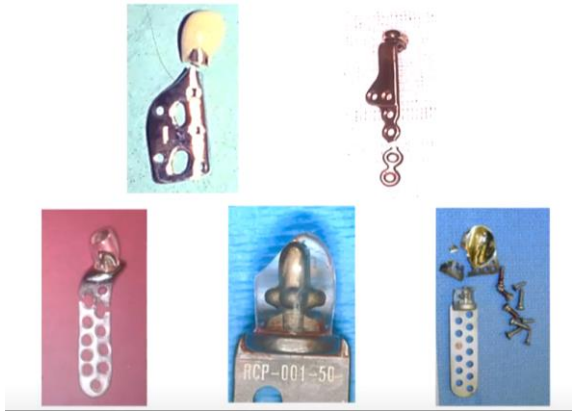
Échecs

Classification des échecs de prothèses articulaires

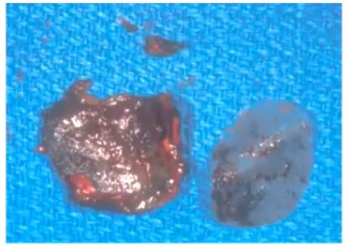
- échec de conception
- échec de mise en place
- échec technique
- limitation technologie

Schmalzried TP, Brown IC. Mechanisms of Prosthetic Joint Failure. In, Gallante JO, et al (eds). Total Hip Revisi
Surgery. Raven Press. New York, 1995; 322-31.

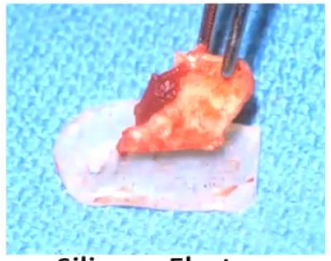
Échecs



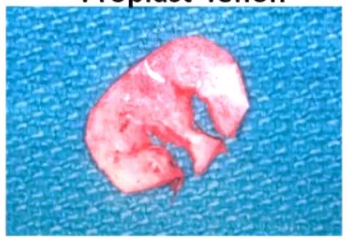
Conception: le dispositif doit satisfaire les principes fondamentaux d'anatomie, de physiologie, immunologie et/ou biomécanique



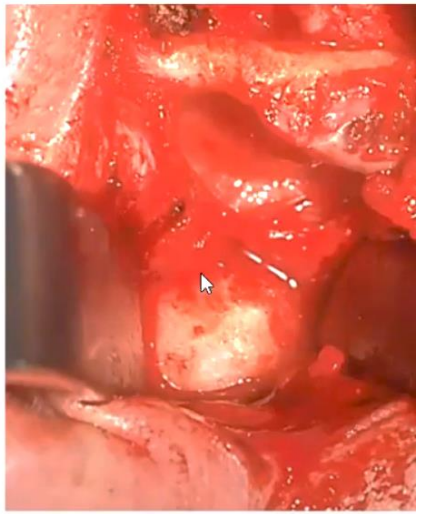
Proplast-Teflon



Silicone Elastomer



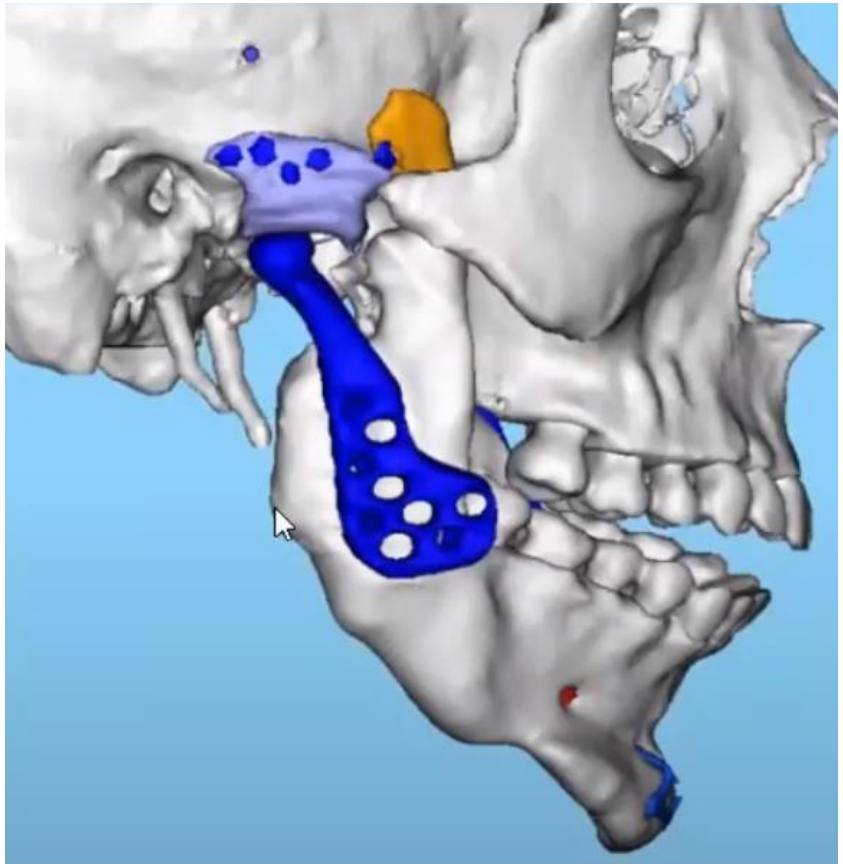
Mercuri LG. Silicone Elastomer Implants in TMJ Surgery. Guest Editorial. Br J Oral Maxillofac Surg 51:584–86, 2013.



hemiarthroplastie

Échecs

Technique: position



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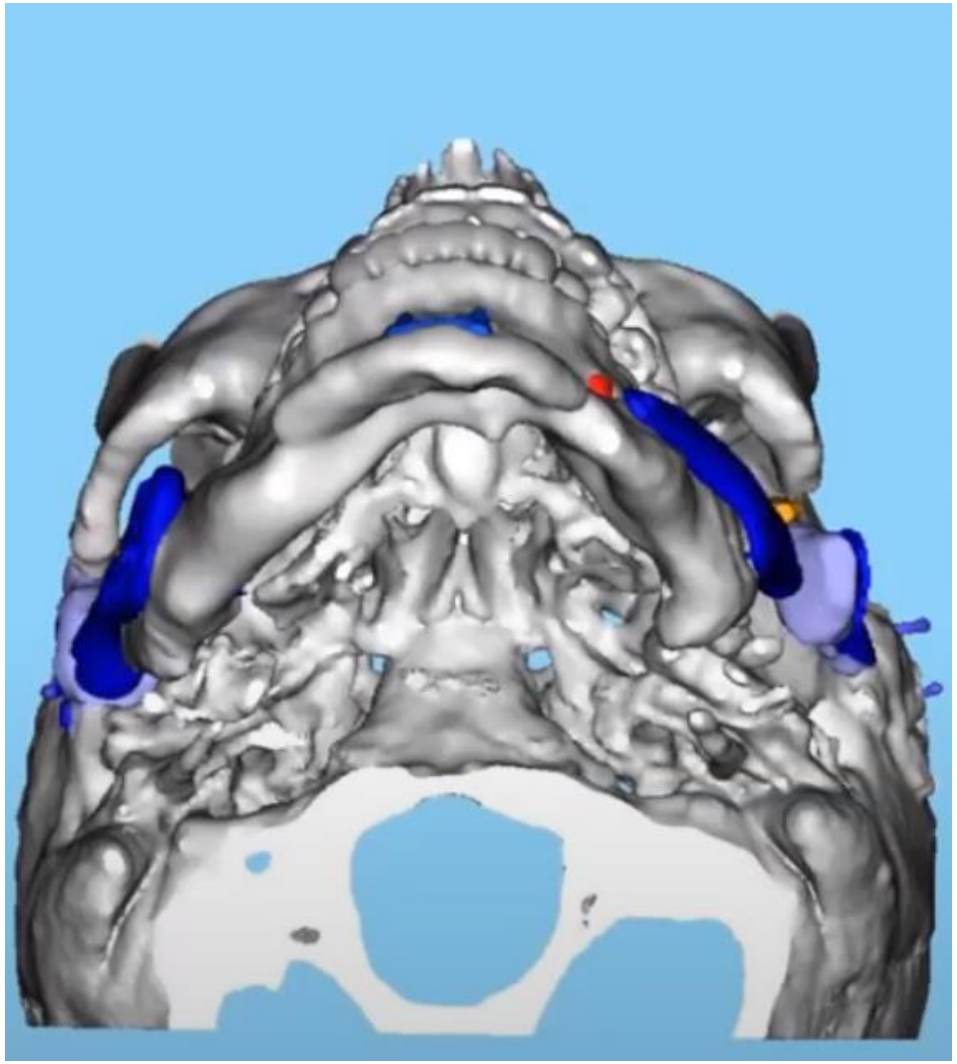
Échecs

Technique: position



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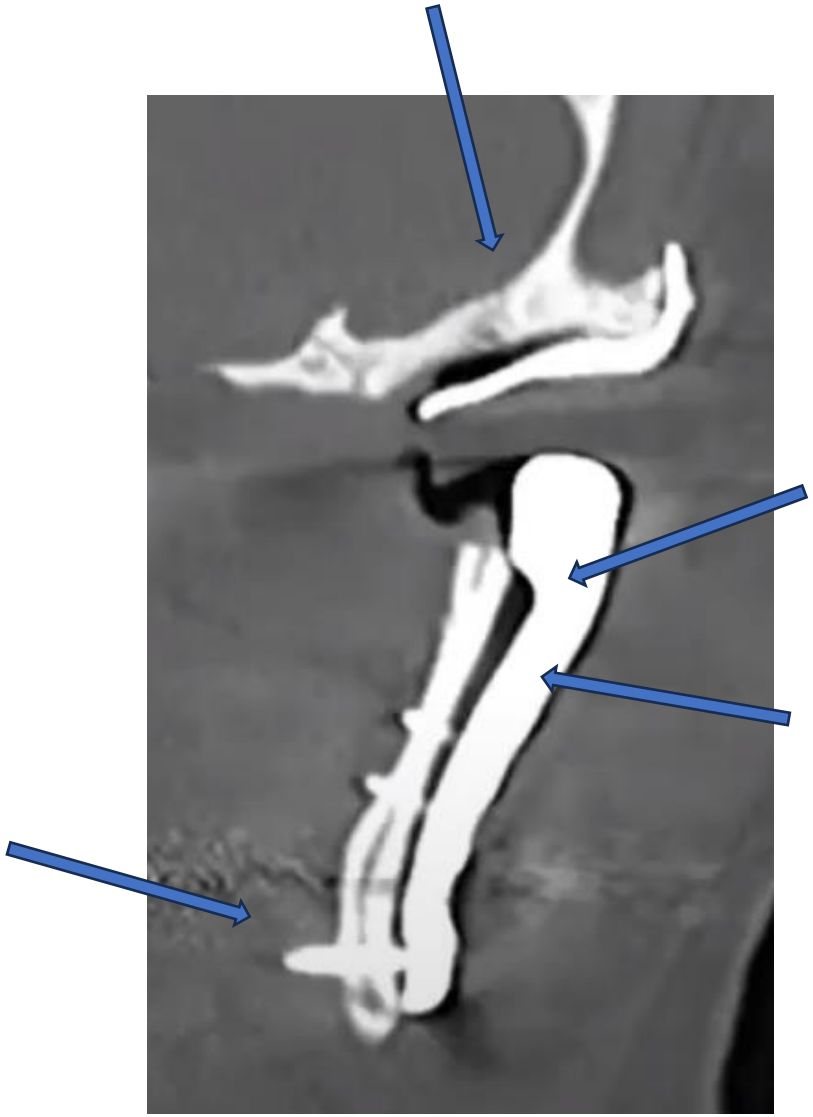
Échecs

Technique: position



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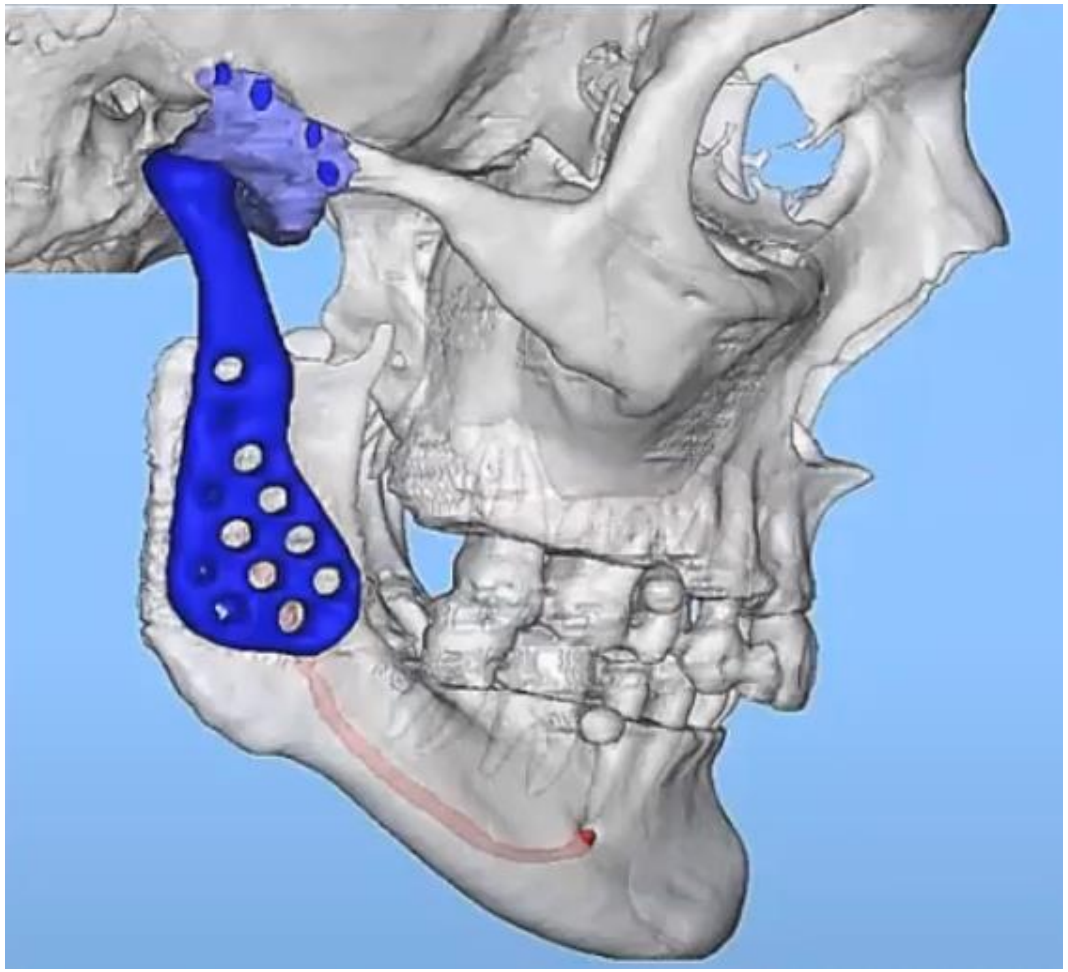
Échecs

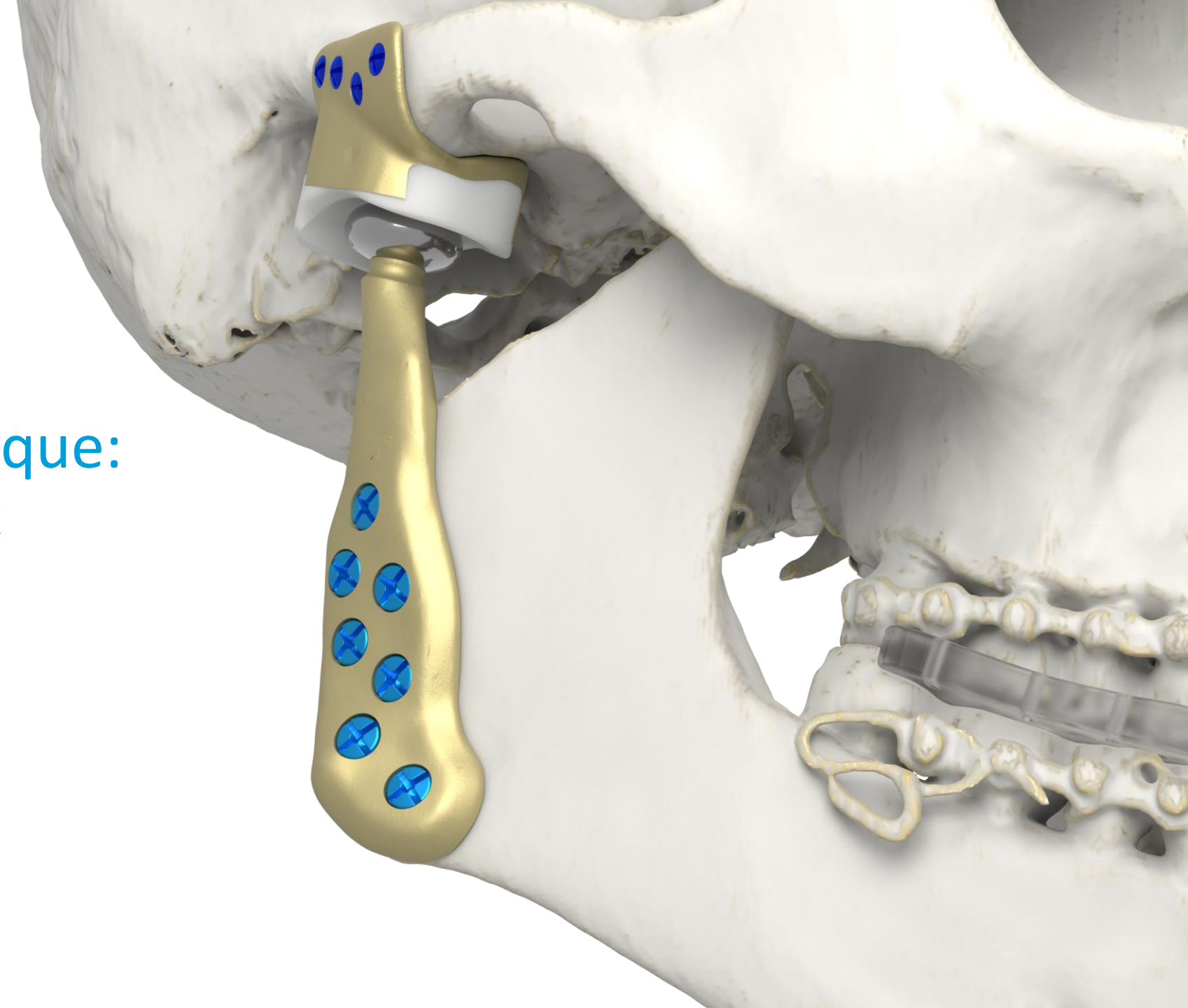
Technique: luxation postérieure

Prothèse standard



Avancée Technologique:

De la planification 3D aux implants personnalisés



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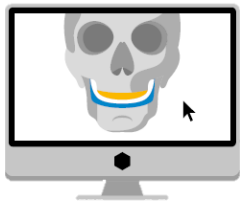
Faculté de biologie et de médecine

SCAN

1

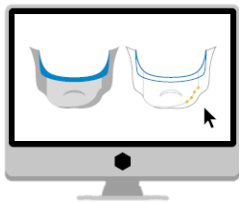


MODELE 3D

2

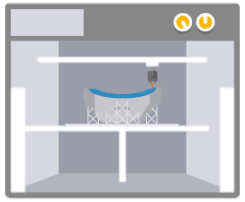
PLANIFICATION

3



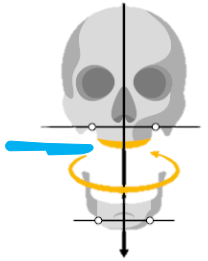
DESIGN

4



PRODUCTION

5



CHIRURGIE

6

ANALYSE POST-OP

7

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Faculté de biologie et de médecine

SCAN

1

1

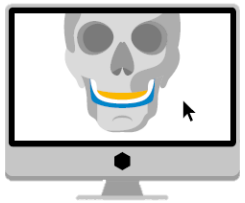
Hôpital

Télécharger le protocol scanner

Réaliser **le scanner** du patient

Charger **les données DICOM** Online

SCAN



MODELE 3D

1

2

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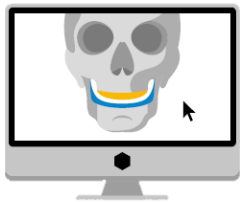
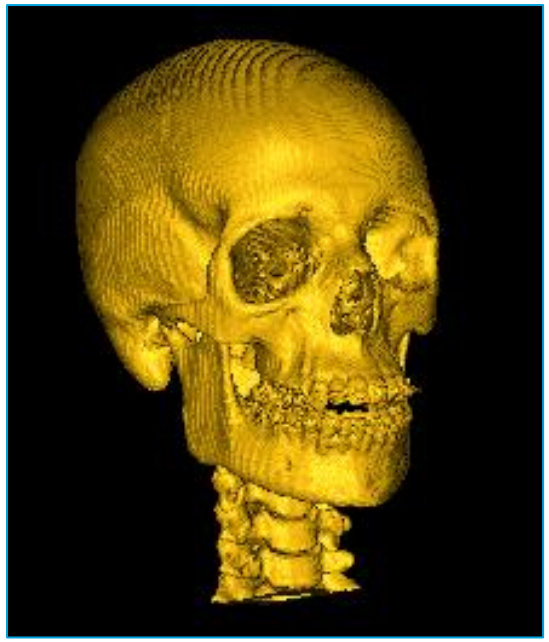
2



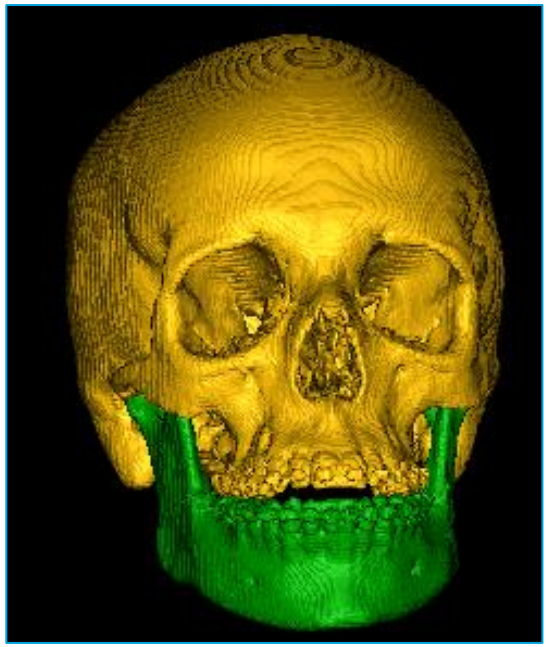
MODELE 3D

Logiciel certifié CE

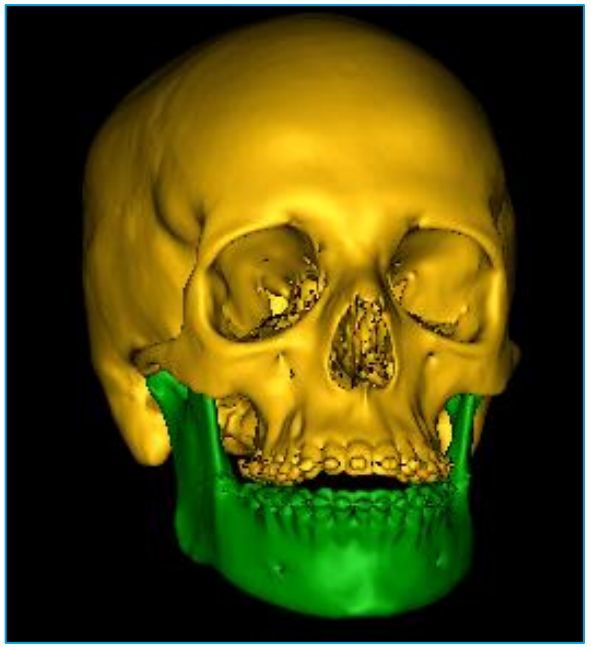
DEFINIR LE SEUIL



CRÉER LE MASQUE



CRÉER L'OBJET 3D



LISSAGE

Création du modèle virtuel 3D.

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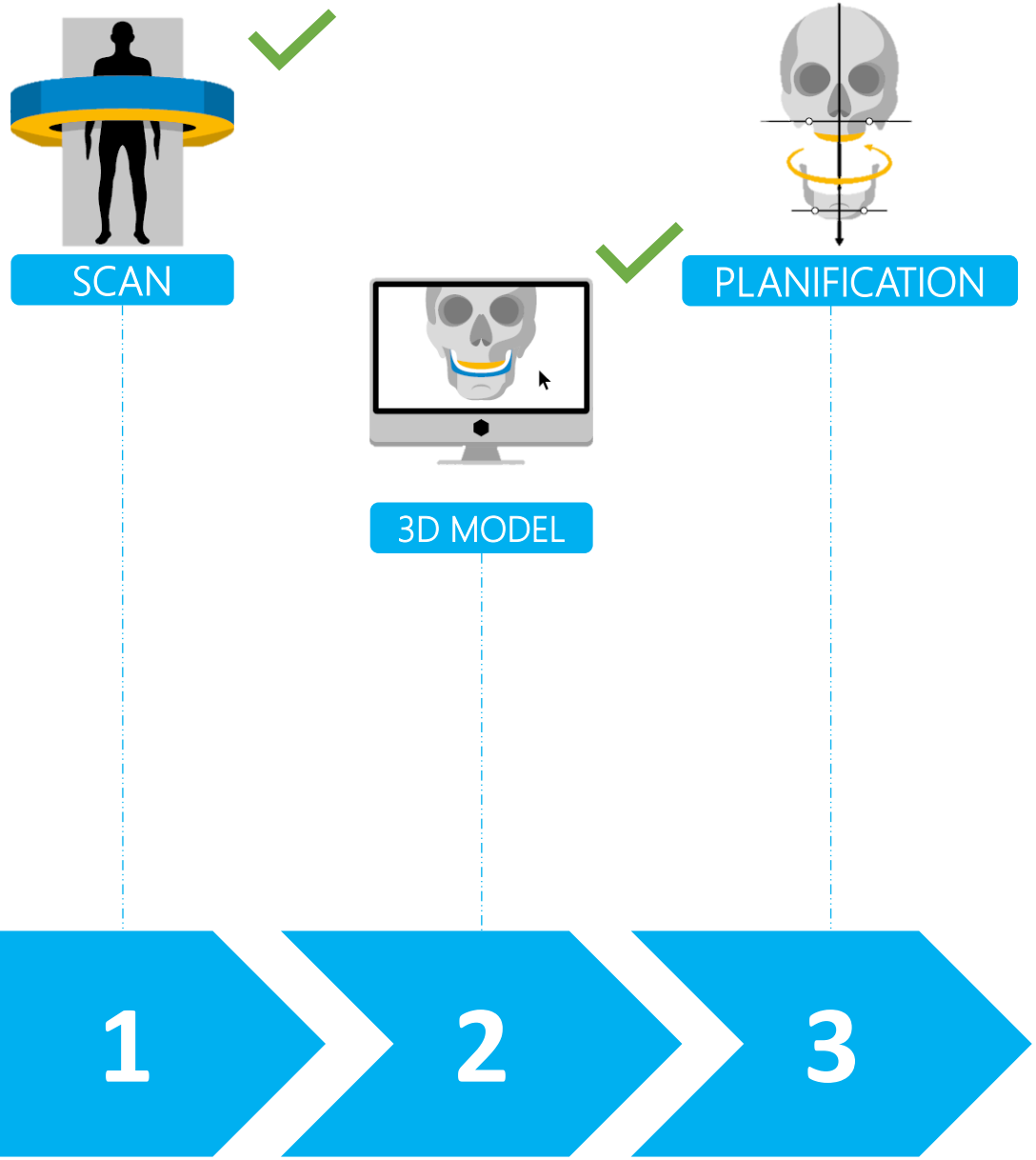

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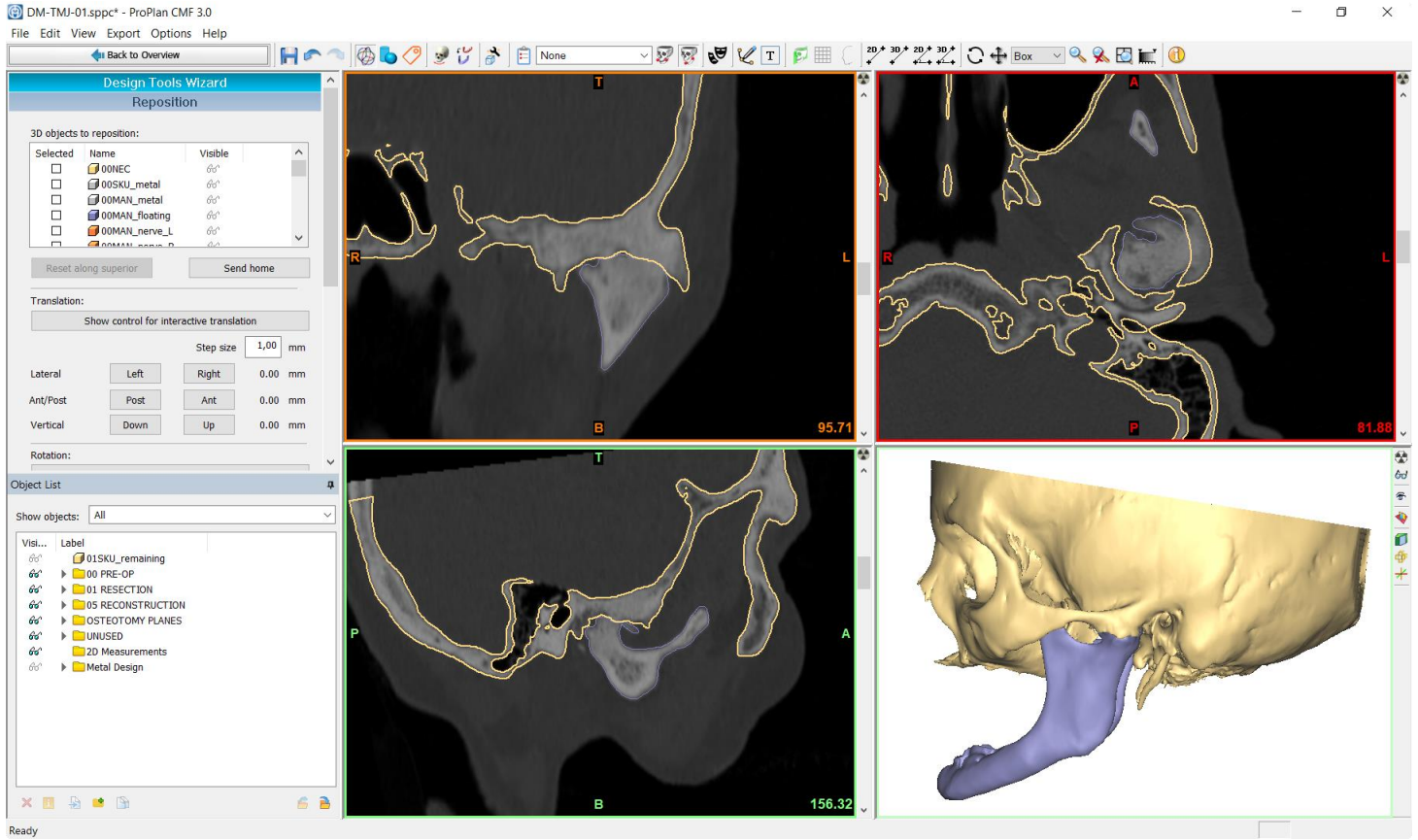
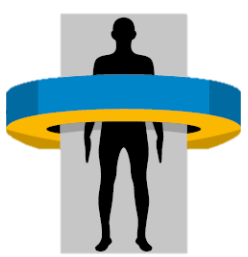
3

PLANIFICATION



Chargement du modèle 3D.



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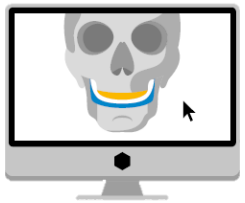
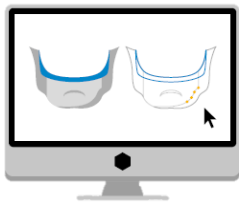


MODELE 3D

PLANIFICATION



DESIGN

1 2 3 4

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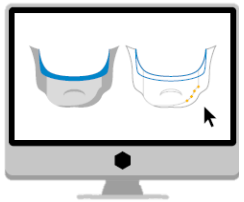
4



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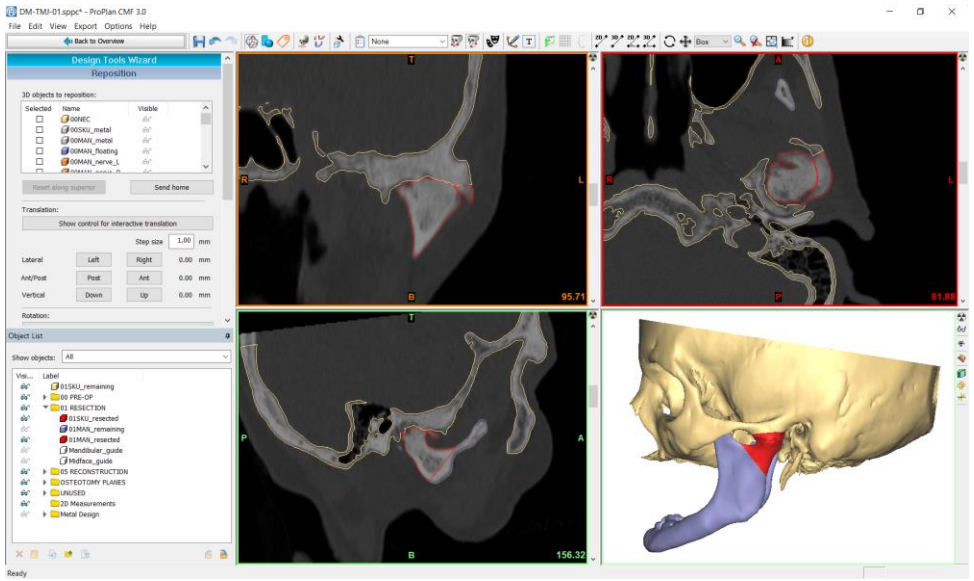
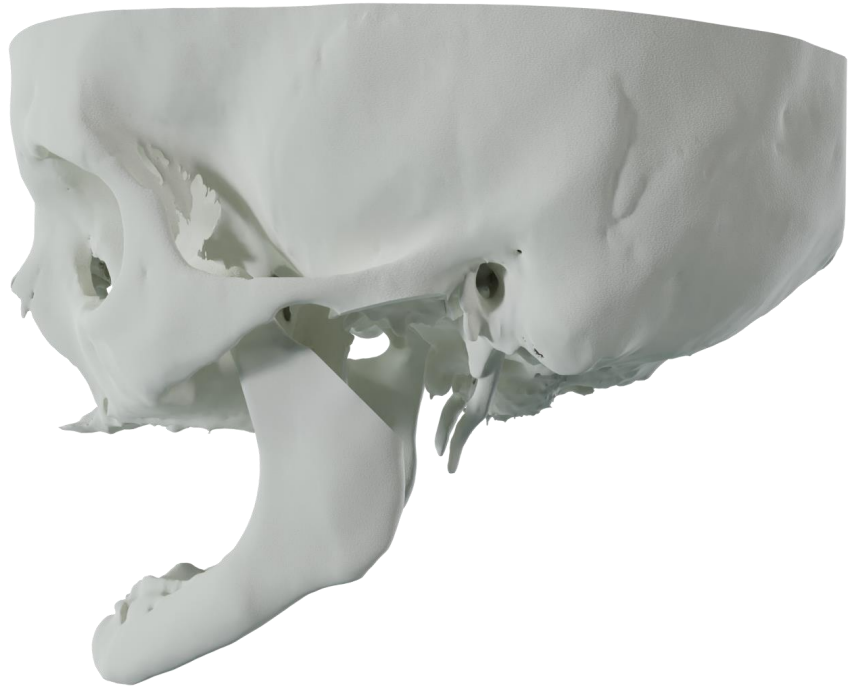
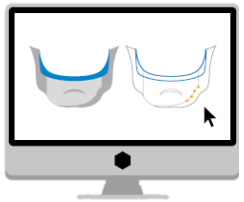




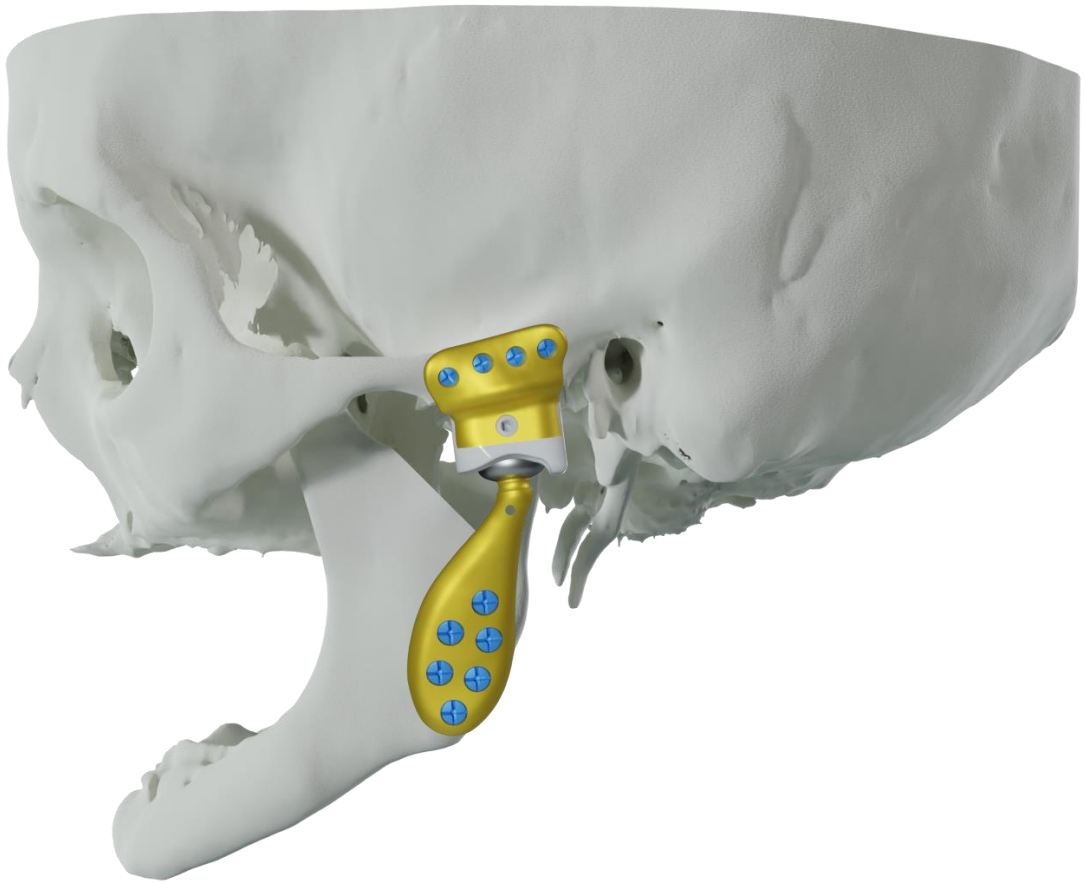
Exportez les objets planifiés.

4



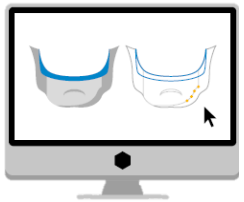
DESIGN

Positionnement des vis

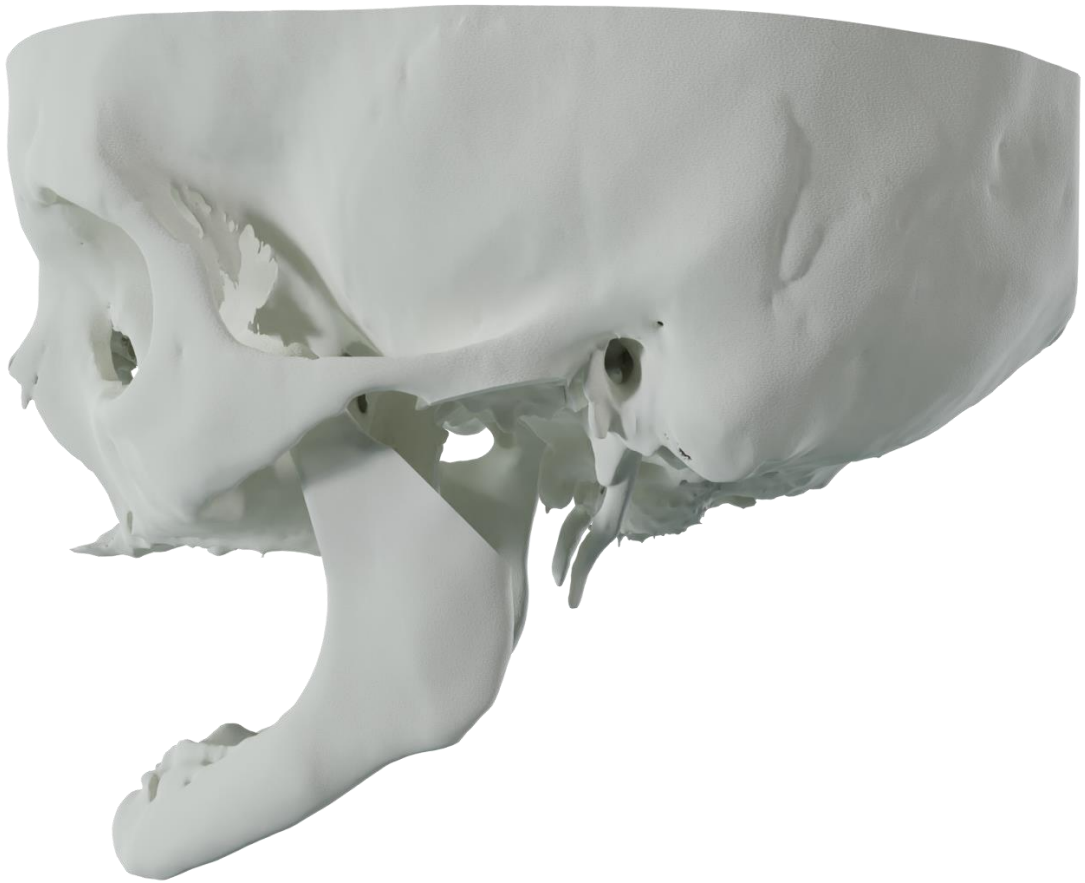


Design de l’implant.

4



DESIGN



Composant mandibulaire

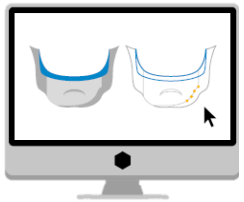
- Tête en CoCr
- Corps en titane
- Vis à vérouillage 2.4mm

Composant temporal

- Articulation UHMW - Polyethelene
- Corps en titane
- Vis 2.0mm

Spécifications de l'implant

4



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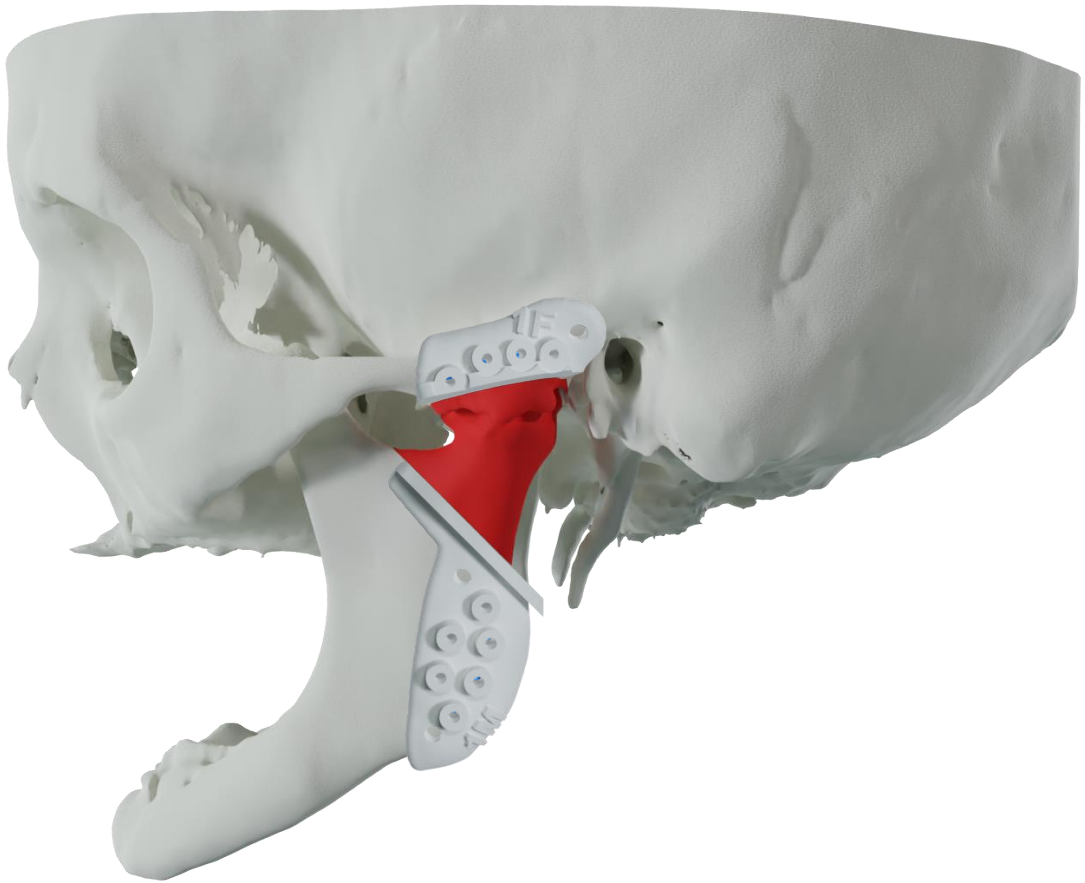
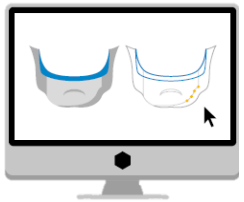


Design du guide.

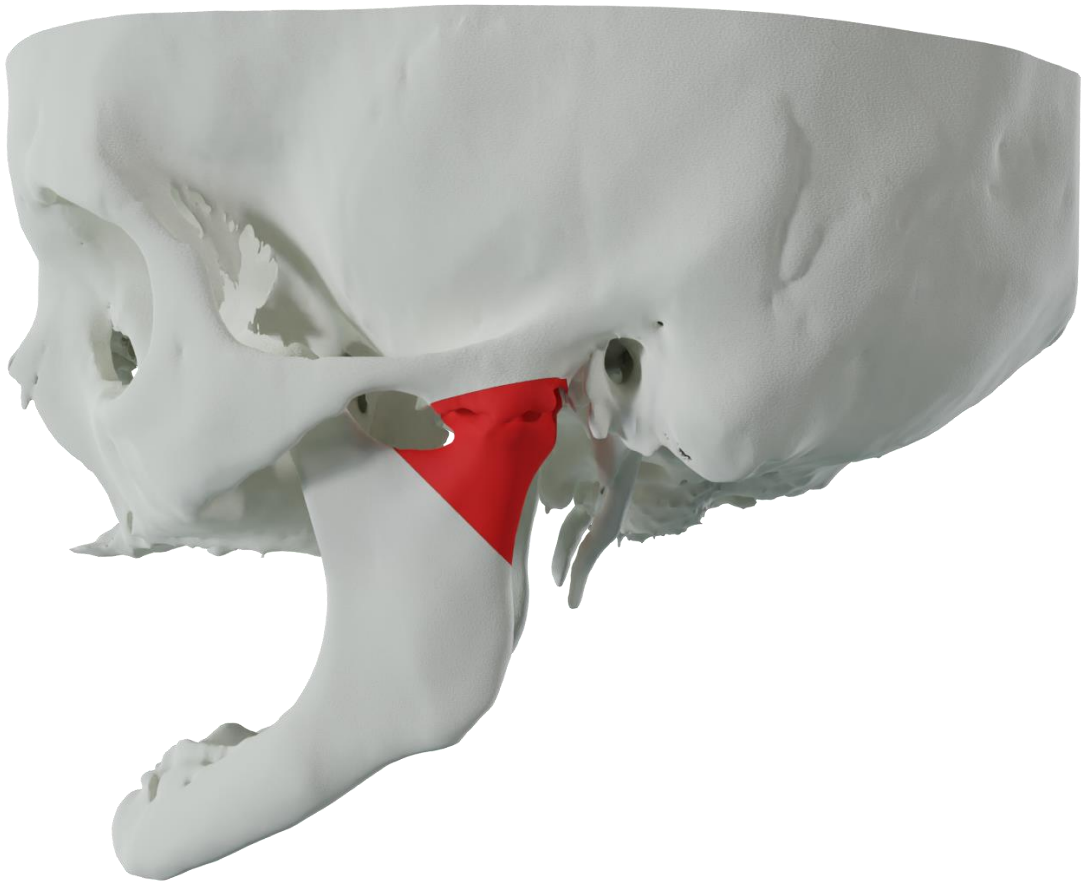
4



DESIGN

Guide mandibulaire

- Polyamide
- Trous de préforage
- Guidage de l’ostéotomie

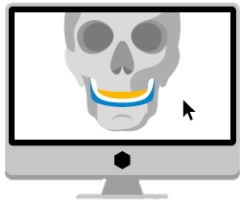


Design du guide.

Guide temporal

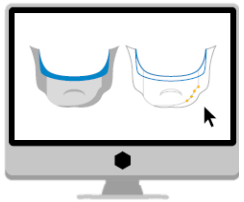
- Polyamide
- Trous de préforage
- Guidage de l’ostéotomie

SCAN



MODELE 3D

PLANIFICATION



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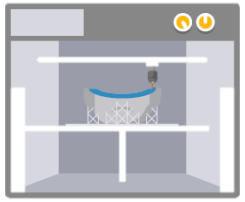
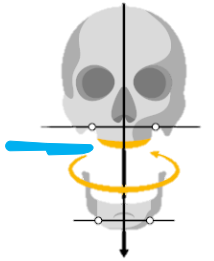


PRODUCTION



CHIRURGIE

1 2 3 4 5 6

6

CHIRURGIE

Procédure chirurgicale

Abord

- Différents abords:
  - Incision submandibulaire
  - Incision pré-auriculaire
- Neuromonitoring périopératoire

6

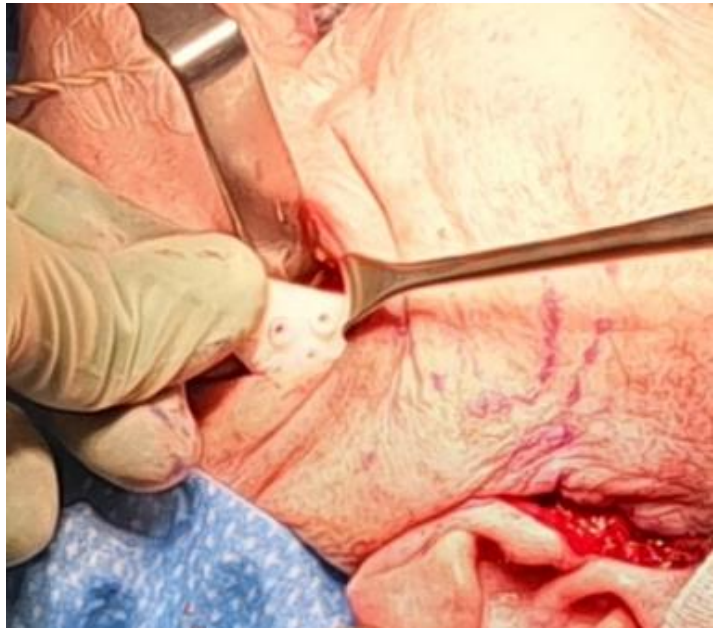
CHIRURGIE

Procédure chirurgicale

Condylectomie et préforage

- Insertion du guide mandibulaire
  ➔ Fixation temporaire à l'aide de deux vis

- La resection peut être réalisée en plusieurs étapes:
  ➔ Dépend de l'ampleur de la déformation
  ➔ Facilite l'ostéotomie finale planifiée



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materialise

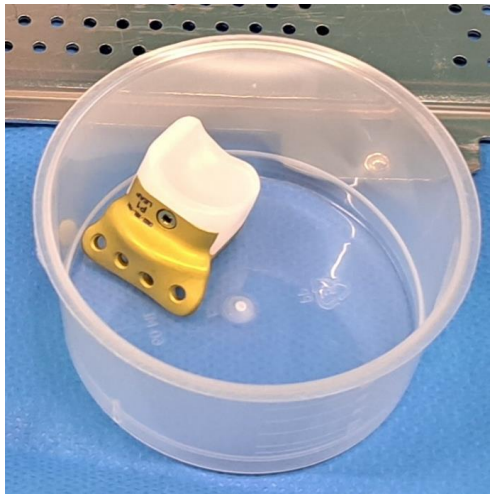
6

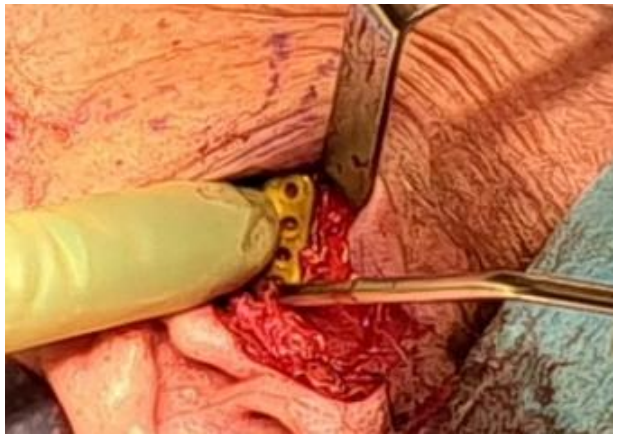
CHIRURGIE

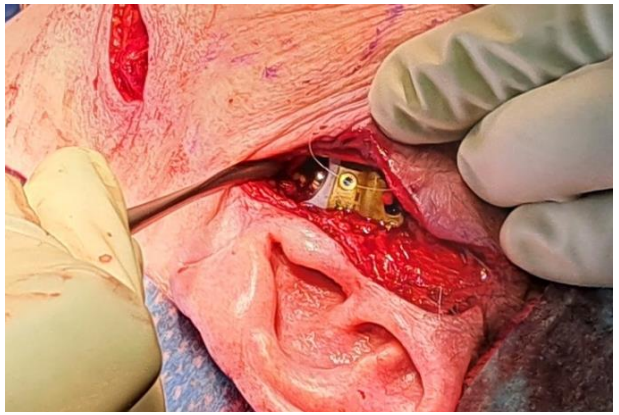
Procédure chirurgicale

Fixation du composant temporal

- Insertion du composant temporal
  ➔ Fixation avec deux vis
- Vérifier la stabilité
- Fixation complète du composant







6

CHIRURGIE

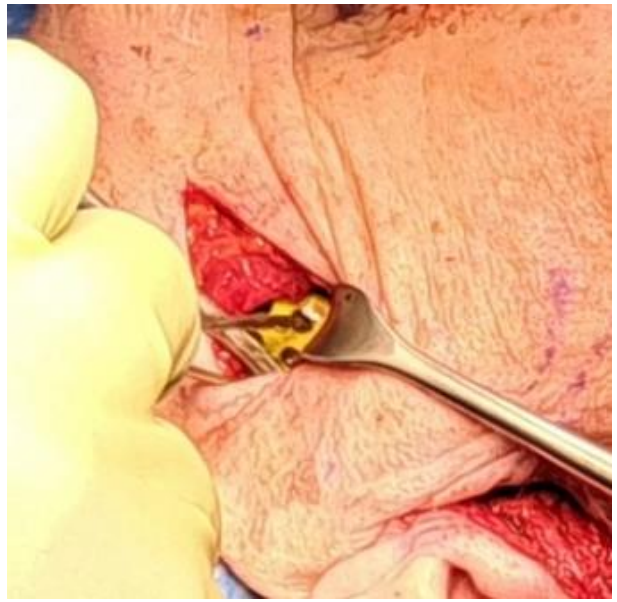
Procédure chirurgicale

Fixation du composant mandibulaire

- Insertion du composant mandibulaire
  ➔ Fixation avec deux vis

- Vérifier:
  - Ampleur du mouvement
  - Tissus mous environnants
  - Conduit auditif externe

- Fixation complète du composant



6

CHIRURGIE

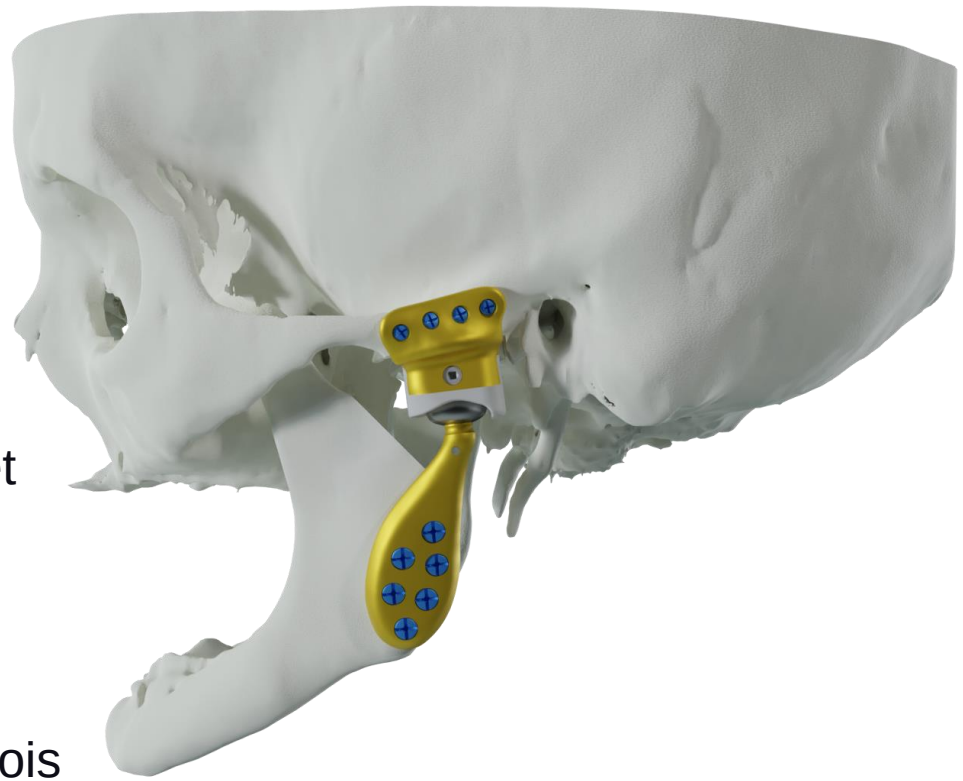
Procédure chirurgicale

Traitement post-opératoire

- Physiothérapie en cas de besoin :
  - Douleur
  - Ouverture de bouche limitée
- Botox 20-50 UI dans le muscle temporal en cas de besoin :
  - Obligatoire en cas de TMD préexistant en pré et postopératoire
- Sutures retirées 7 jours après l'opération

Suivi:

- 1 semaine – 3 semaines – 6 semaines - 3 mois – 6 mois



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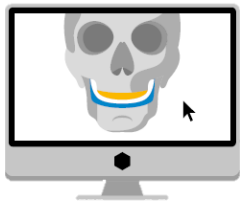
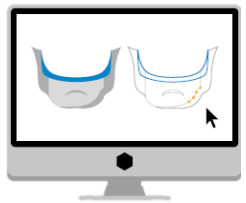


MODELE 3D

PLANIFICATION



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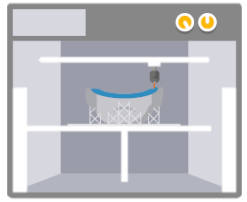

PRODUCTION

CHIRURGIE

ANALYSE POST-OP

1 2 3 4 5 6 7

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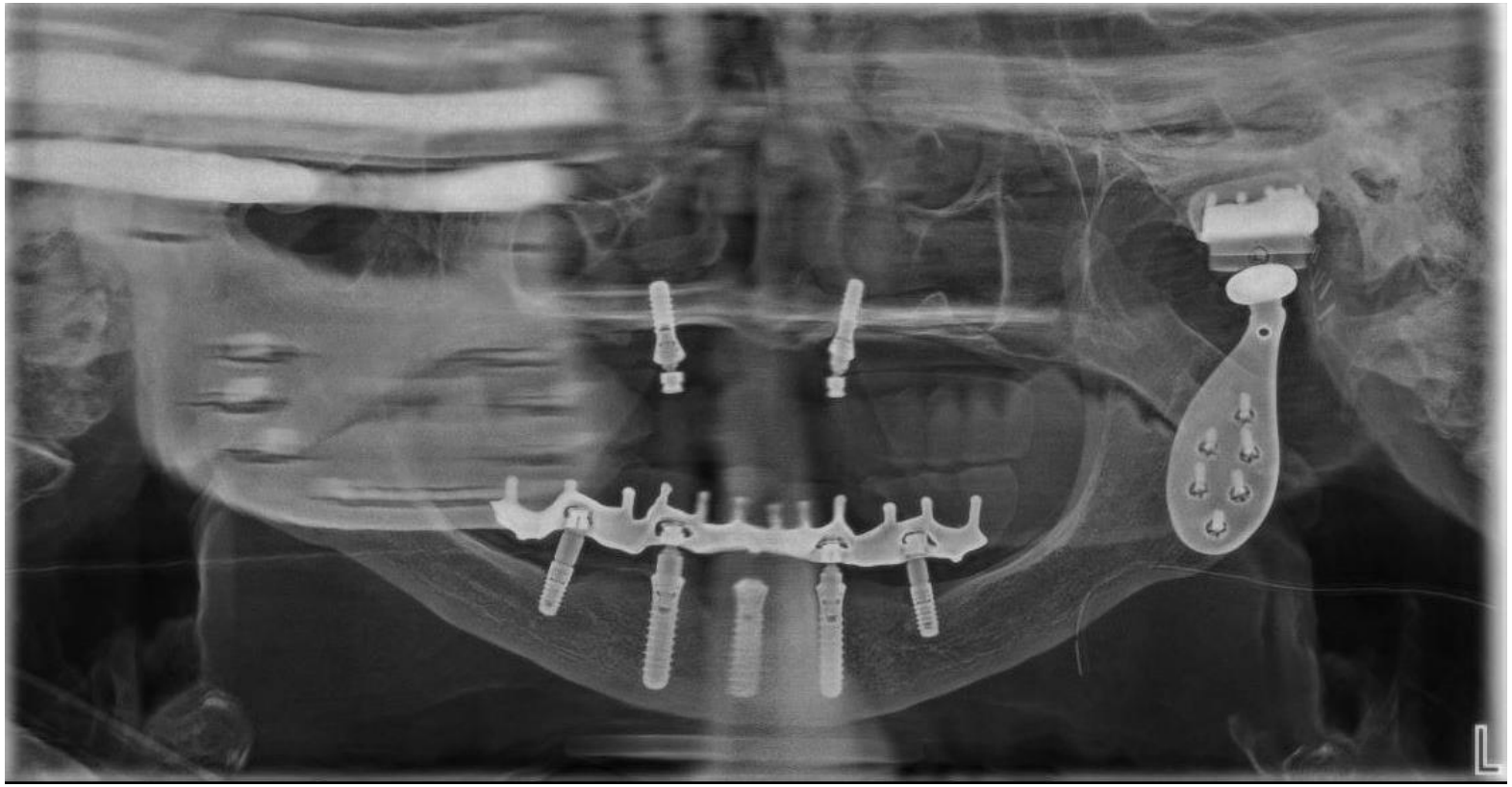
7

ANALYSE POST-OP

Résultats post-op



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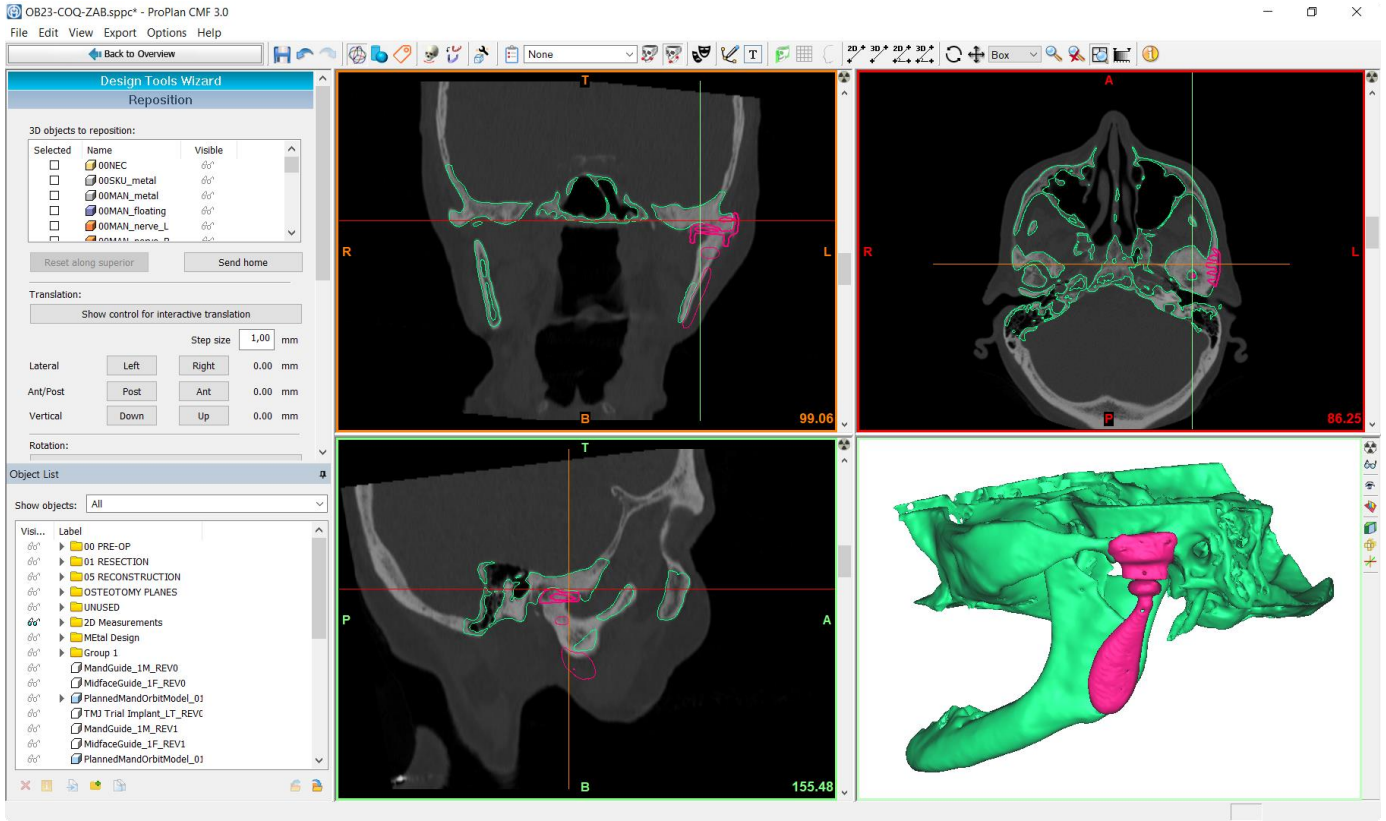
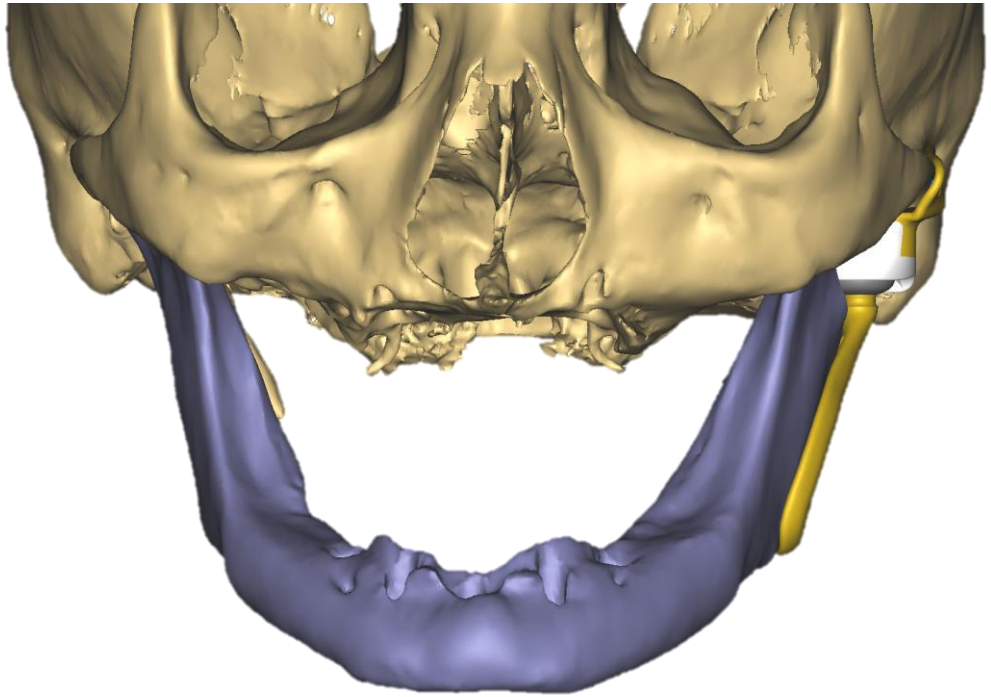
ANALYSE POST-OP



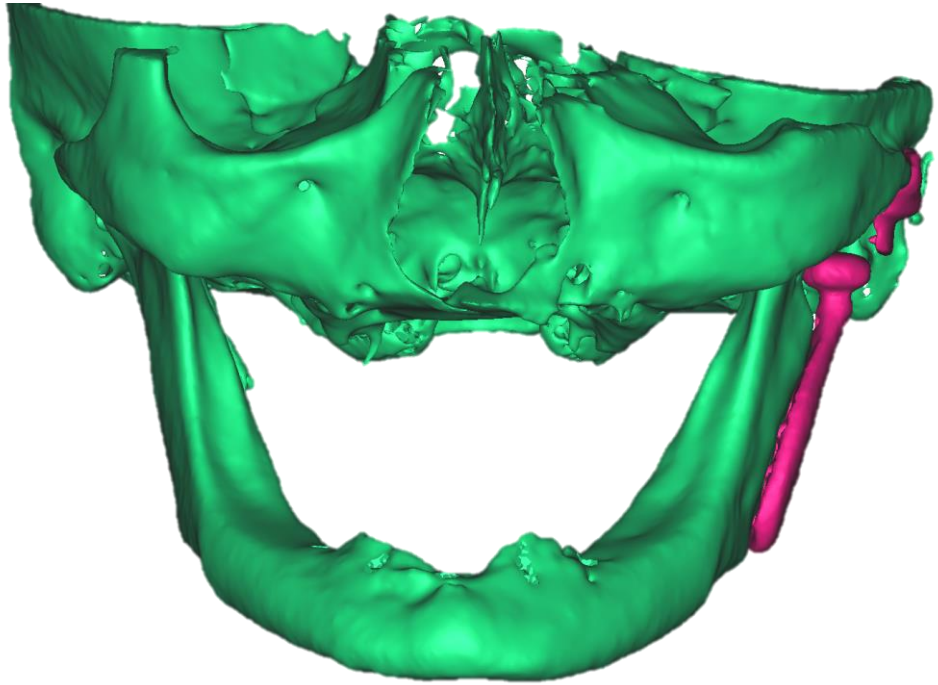
Scanner 4 mois post-op

7

ANALYSE POST-OP



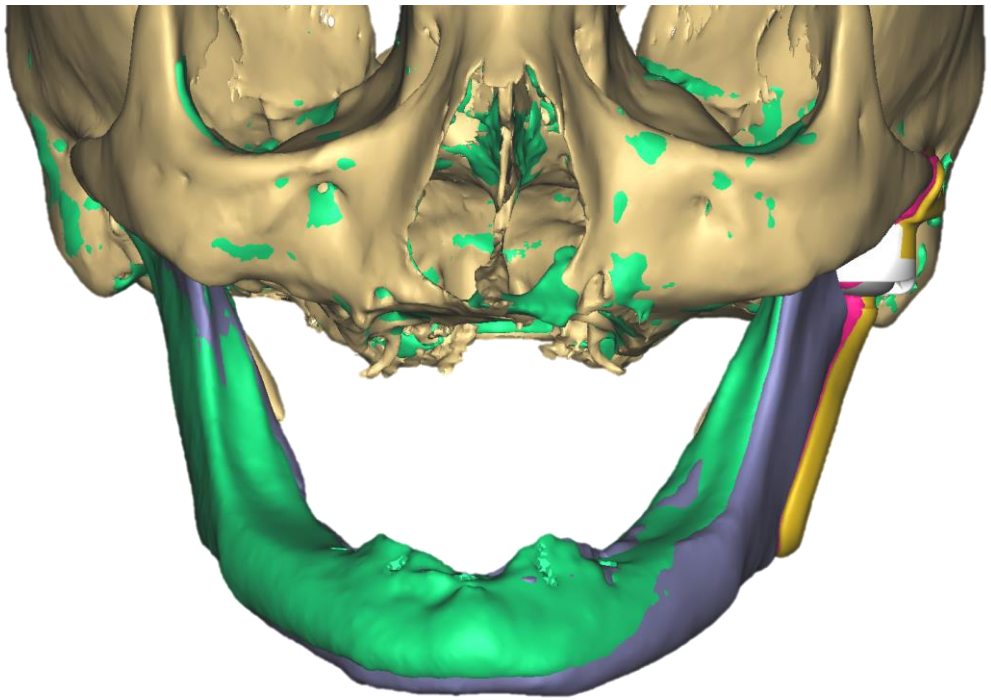
Anatomie préopératoire



Anatomie post-opératoire

7

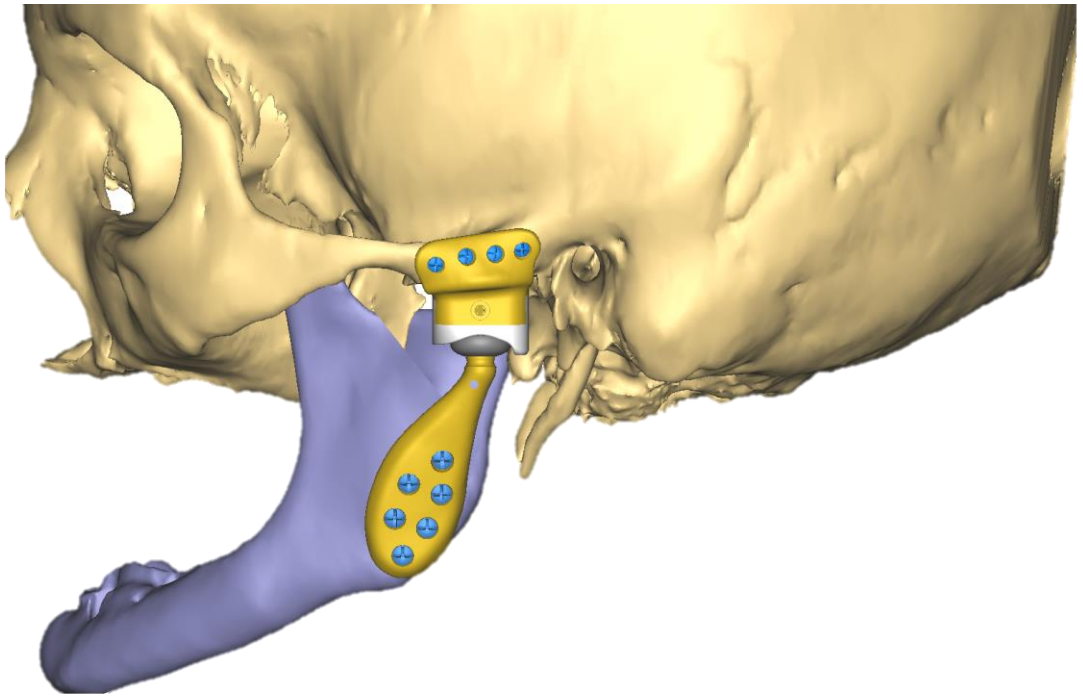
ANALYSE POST-OP



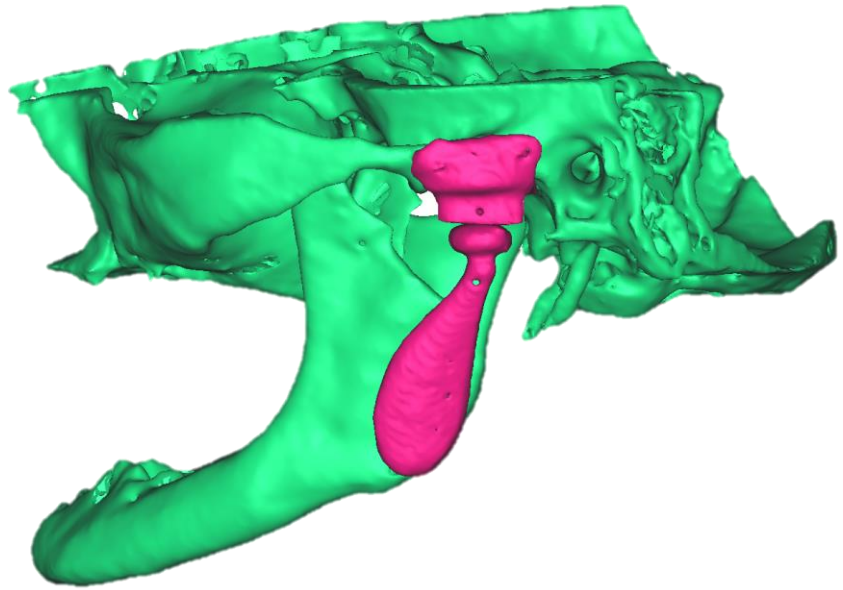
Superposition des surfaces

7

ANALYSE POST-OP



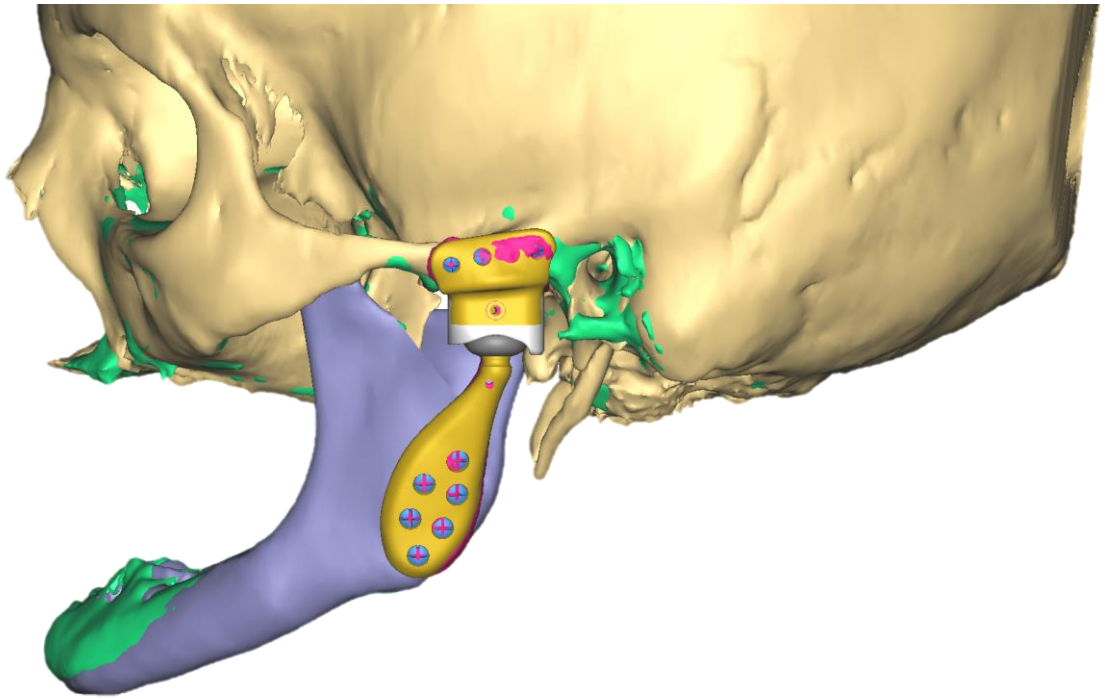
Anatomie préopératoire



Anatomie post-opératoire

7

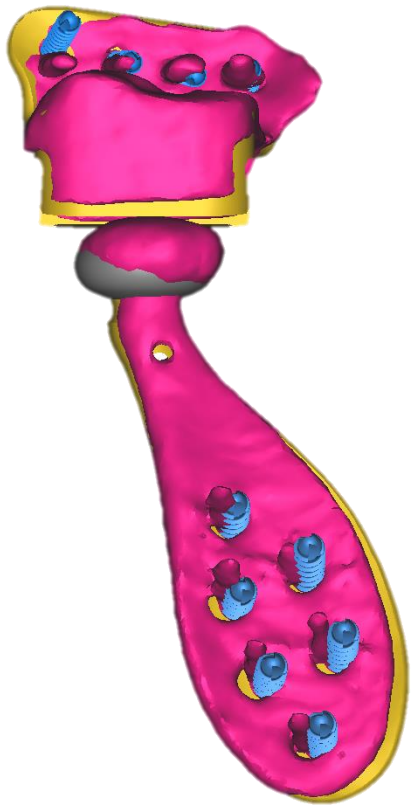
ANALYSE POST-OP

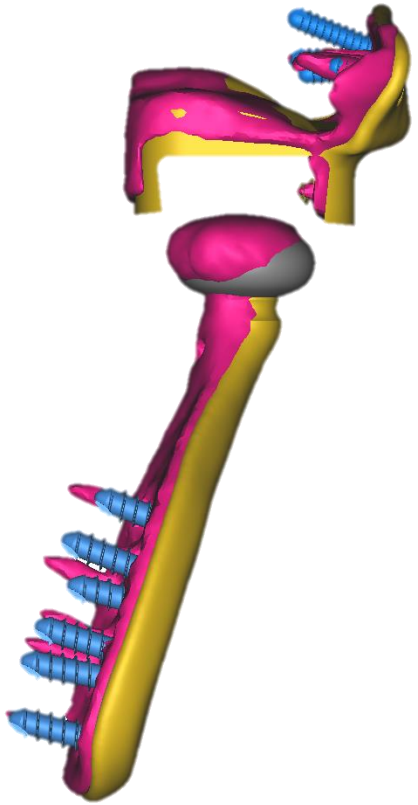


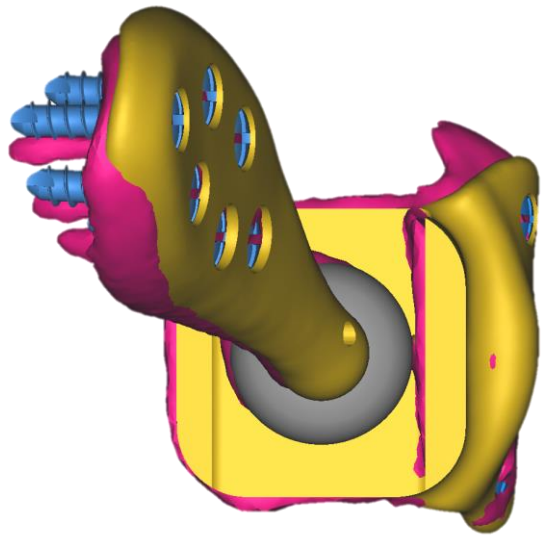
Superposition des surfaces

7

ANALYSE POST-OP







Précision <1.5mm.

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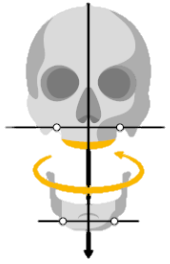
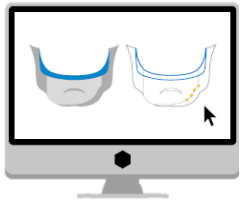
SCAN

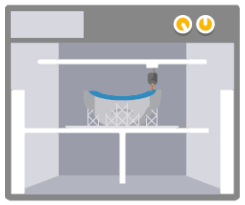
MODELE 3D



PLANNING

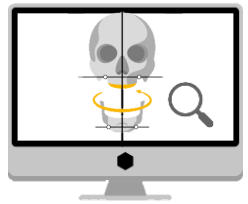


DESIGN



PRODUCTION

CHIRURGIE



ANALYSE POST-OP

1 2 3 4 5 6 7

Durée totale

2,5 mois

Préparation du cas	Planification	Design	Production	livraison
1 jour ouvrable	30 min*	5 jours ouvr.	43 jours ouvr.	1-2 jours ouvrables

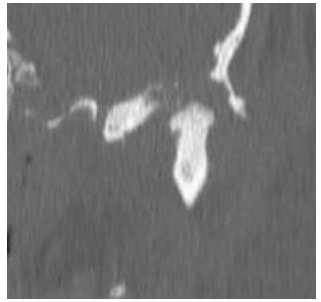
Premiers cas: peu d'alternatives

Femme 37 ans

Ankylose après tumorectomie pour un adenocarcinome

Femme 53 ans

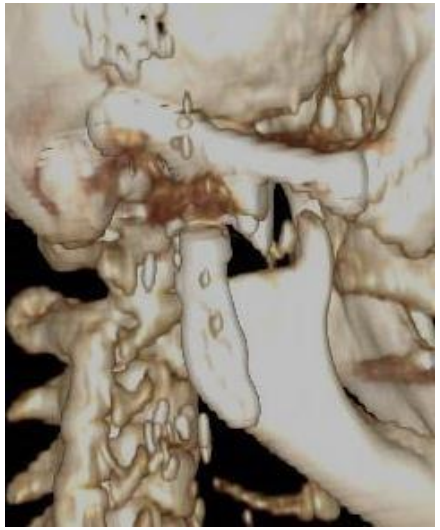
Status après mandibulectomie non reconstruite



Homme 76 ans

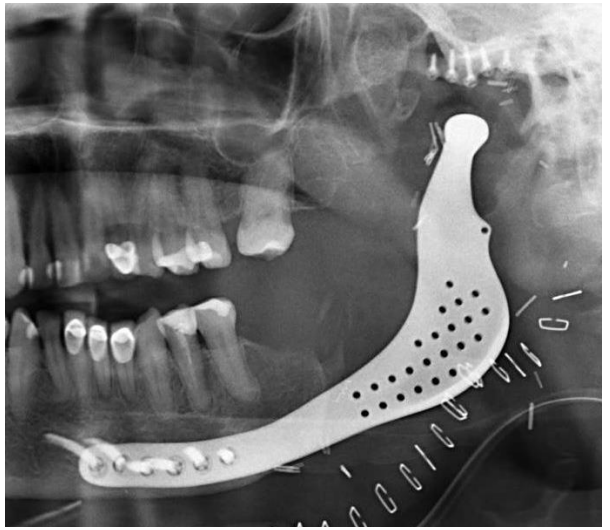
Chondroblastome à cellules géantes

Premiers cas: pos-op



Femme 37 ans

Ankylose après tumorectomie pour un adenocarcinome



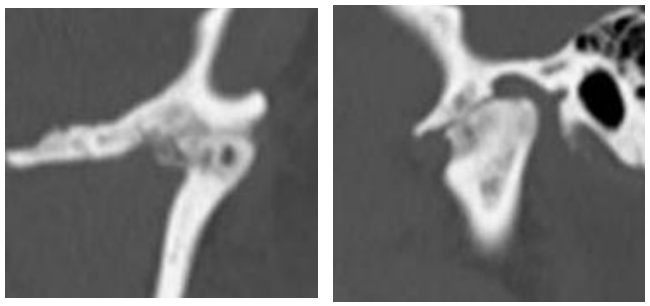
Femme 53 ans

Status après mandibulectomie non reconstruite

Homme 76 ans

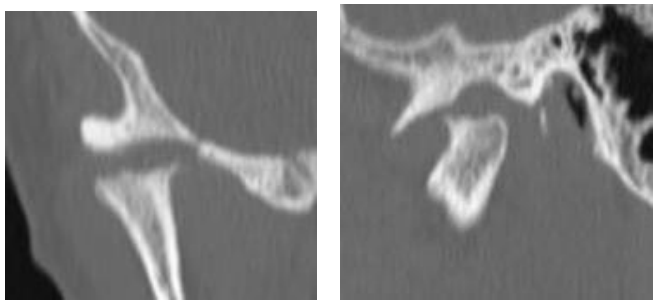
Chondroblastome à cellules géantes

Evolution actuelle



Femme 46 ans

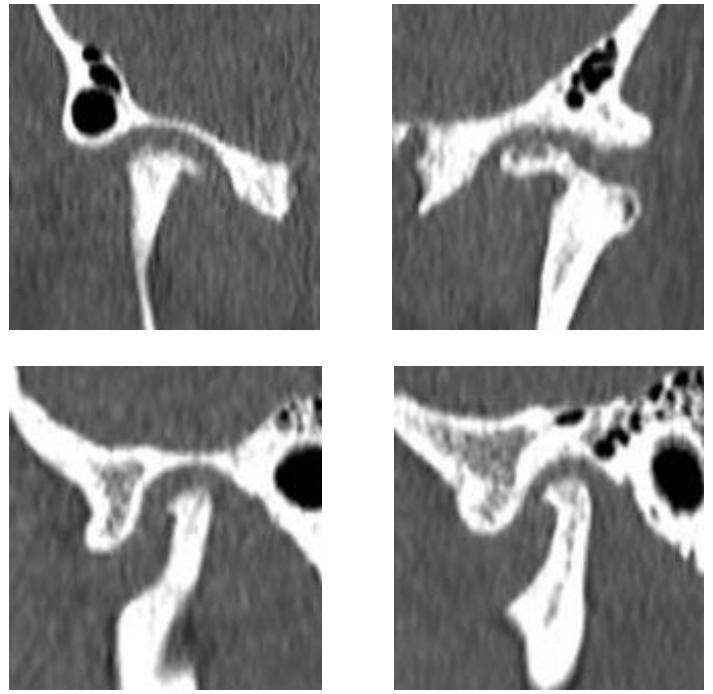
Femme 76 ans



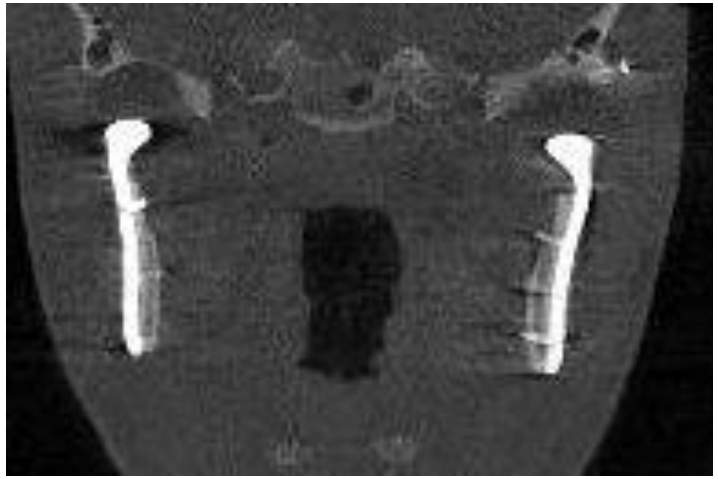
Femme 72 ans

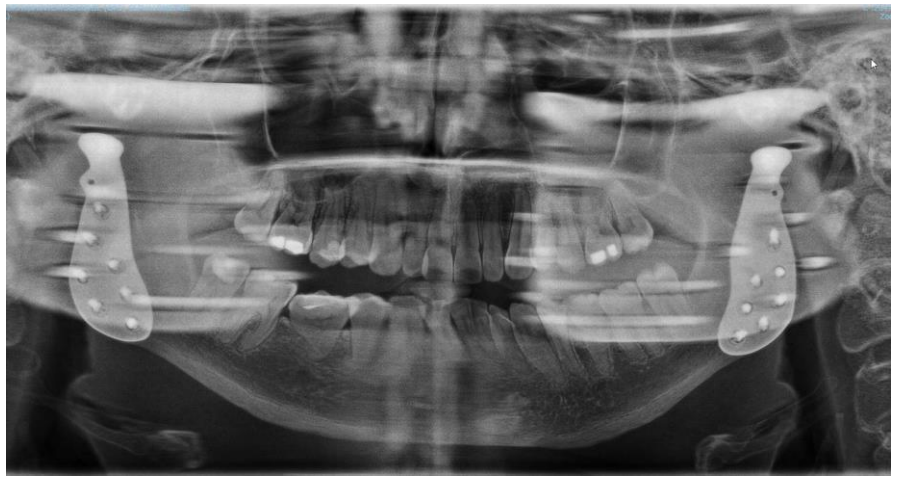
Arthrose bilaterale

- 36 ans
- Douleurs bilatérale depuis 5 ans
- 2018 Meniscopexie bilatérale, 2020 et2021 arthrocenthese
- Diminution progressive OB: Janvier 2022: 2cm
- CT scan: destruction articulaire bilatérale



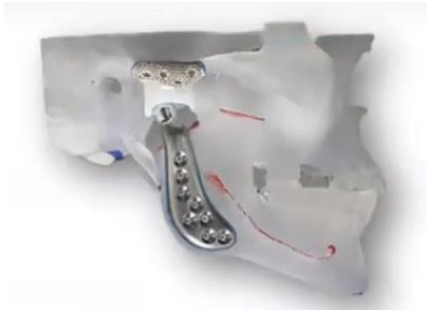
Arthrose bilaterale



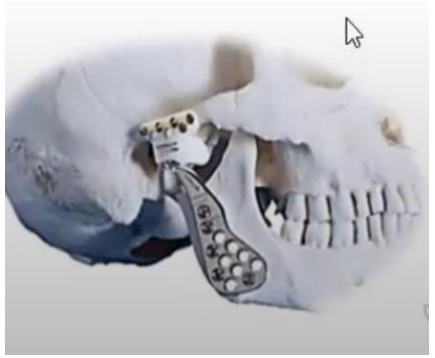


Soulagement immédiat en post-opératoire

OB à 3cm

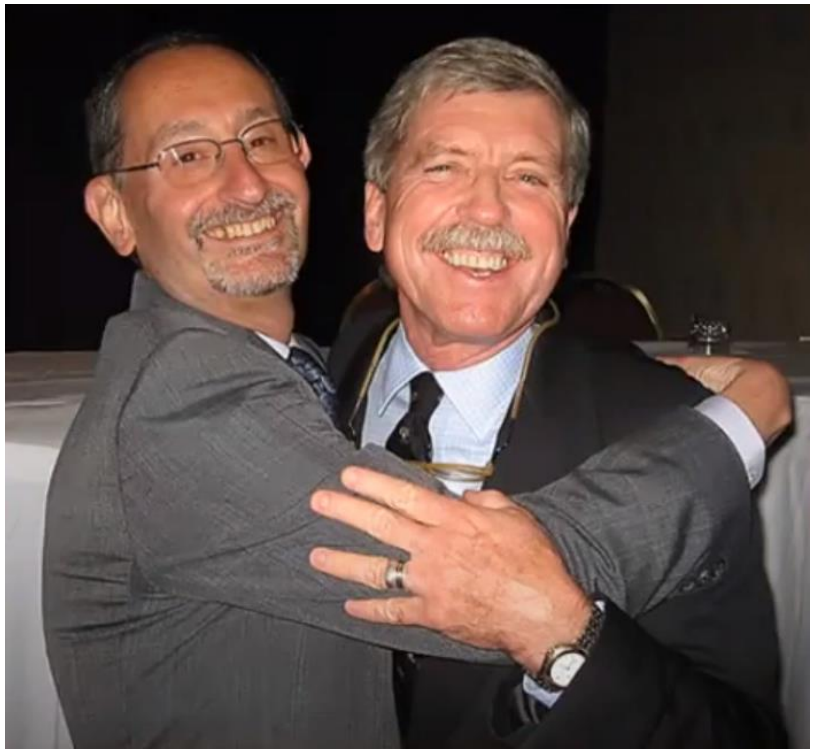


TMJ Concept



Zimmer Biomet

La pratique de la chirurgie maxillofaciale moderne **devrait être impensable** sans matériaux alloplastiques



Louis Mercuri & Peter Quinn

En conclusion

Changement de paradigme: opérer plus vite et éviter de multiples interventions

- Moins de douleurs chroniques
- Moins de tissu cicatriciel
- Chirurgie plus simple
- Utilisation implants sur mesure

Merci pour votre attention !

J M. Carnochan

CLASSIC REPRINT SERIES

Amputation of the Entire Lower Jaw

With Disarticulation of Both Condyles

by
J. M. Carnochan

Forgotten Books

Historique

- Nombreuses publications par la suite, mais que des petites séries et sans suivi et beaucoup d’échecs

Eggers GW: Arthroplasty of the temporomandibular joint in children with interposition of tantillum foil. J Bone Joint Surg 28:603-607, 1946

Historique

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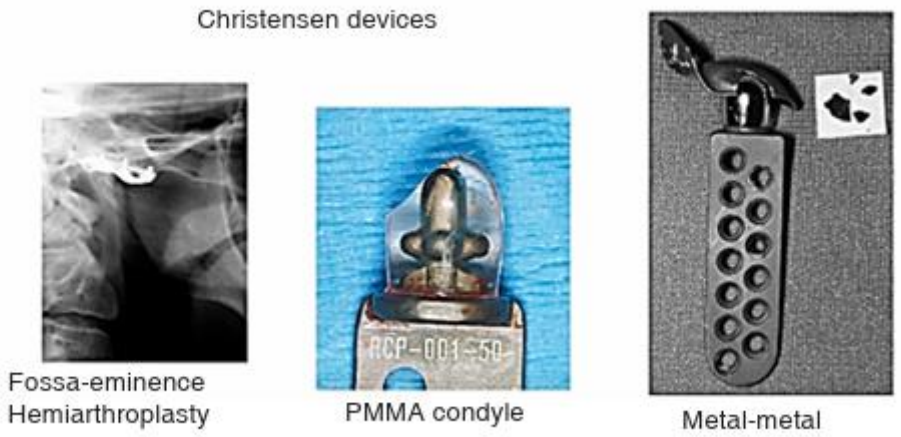
- Années 60: Les «systèmes» Christensen



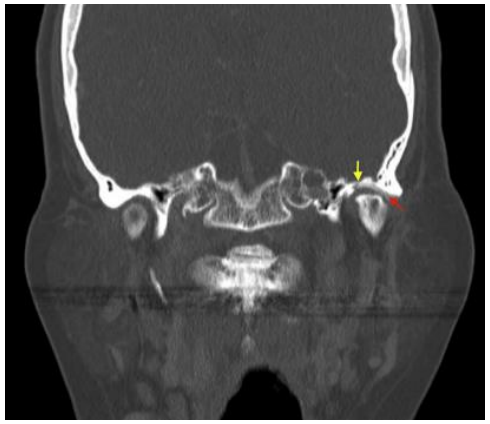
Christensen RW. The correction of mandibular ankylosis by arthroplasty and insertion of a cast vitallium glenoid fossa. Am J Orthop 1963;48:16-24

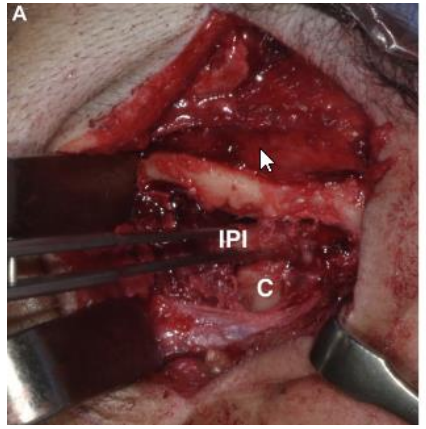
Historique

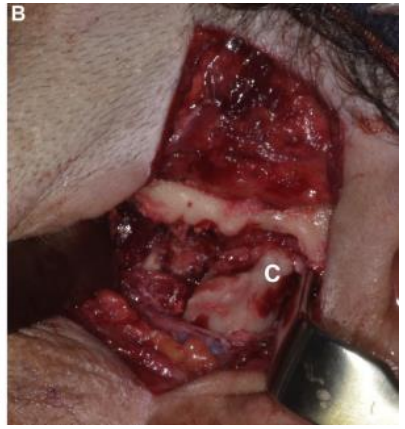
Foreign Body Giant Cell Reaction to a Proplast/Teflon Interpositional Implant: A Case Report and Literature Review

Kevin C. Lee, DDS, Sidney B. Eisig, DDS,† and Michael A. Perrino, DDS, MD‡*

- Nombreuses publications par la suite, mais que des petites séries et sans suivi et beaucoup d'échecs
- Années 60: Les «systèmes» Christensen
- Années 70: interposition intra-articulaire entre la fosse glénoïde et la tête articulaire (Proplast)
  - Proplast I: Couche de Carbone vitreux et PTFE (Teflon)
  - Proplast II: Couche d' Oxyde d' Aluminium et PTFE
  - Proplast HA: Hydroxy-Apatite et PTFE







Historique

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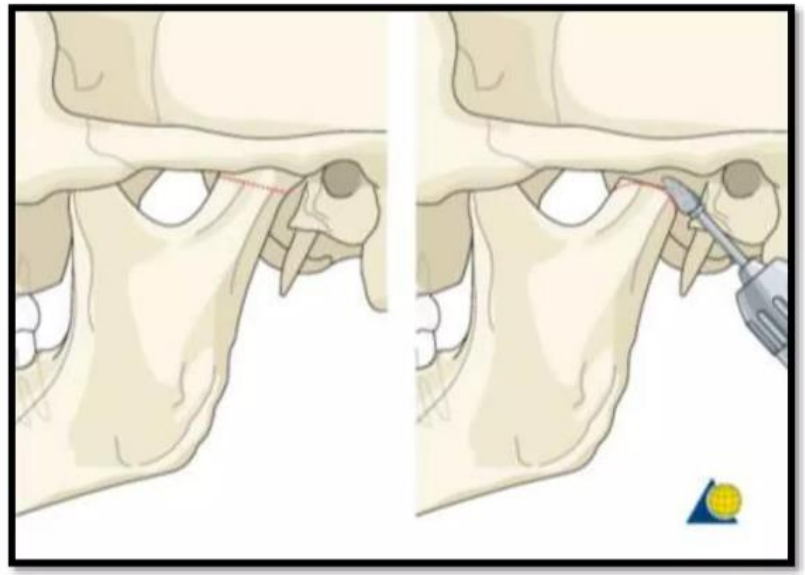
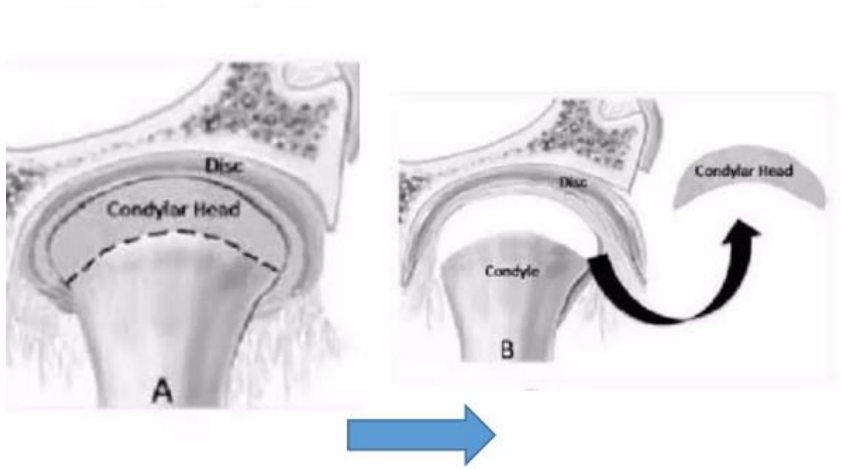
- Années 60: Les «systèmes» Christensen
- Années 70: interposition intra-articulaire entre la fosse glénoïde et la tête articulaire (Proplast)
- La nécessité de prise en charge de ces complication a permis le développement des prothèses articulaires actuelles

Condylectomie

- Excision du condyle

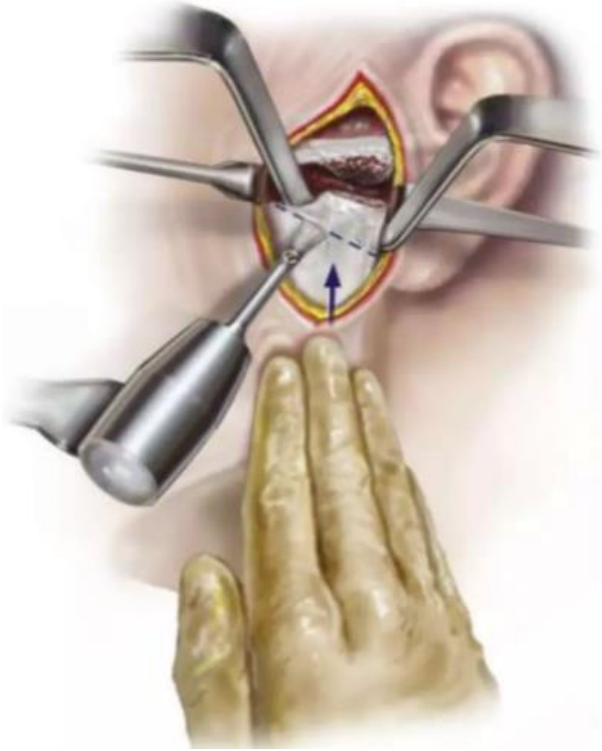
- Complications:
  - Perte de hauteur
  - Trouble occlusion
  - Déviation ouverture
  - Béance si bilatéral





Ostéo-arthrotomie (espace)

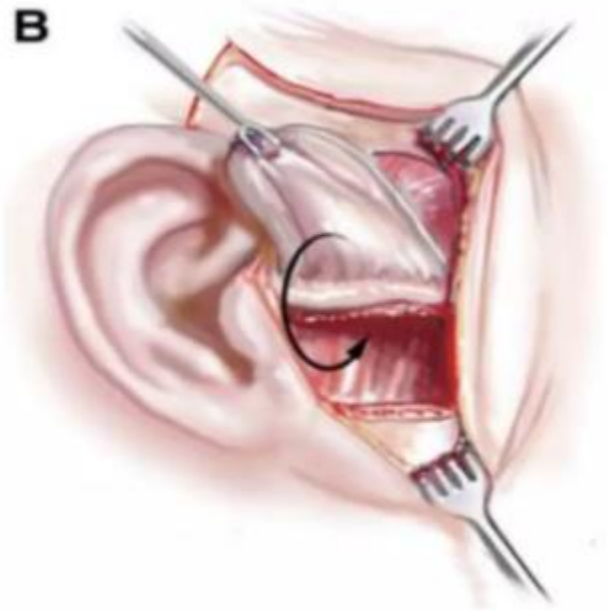
- Avec espace **sans** interposition
- Complications:
  - Réankylose
  - Trouble occlusion



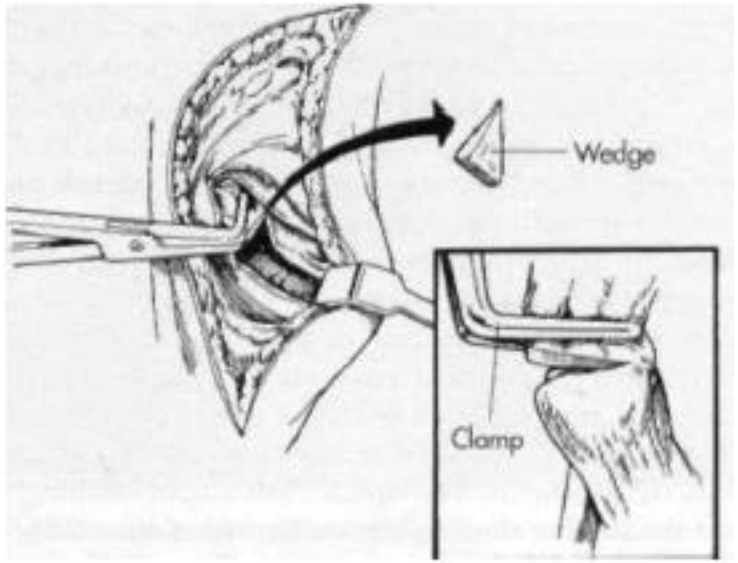
Ostéo-arthrotomie (espace)

- Avec espace **avec** interposition matériau
  a. Autologue: fascia temporal, muscle, graisse, greffe costo-condrale
  b. Alloplastique: titane, or, silastique, Teflon

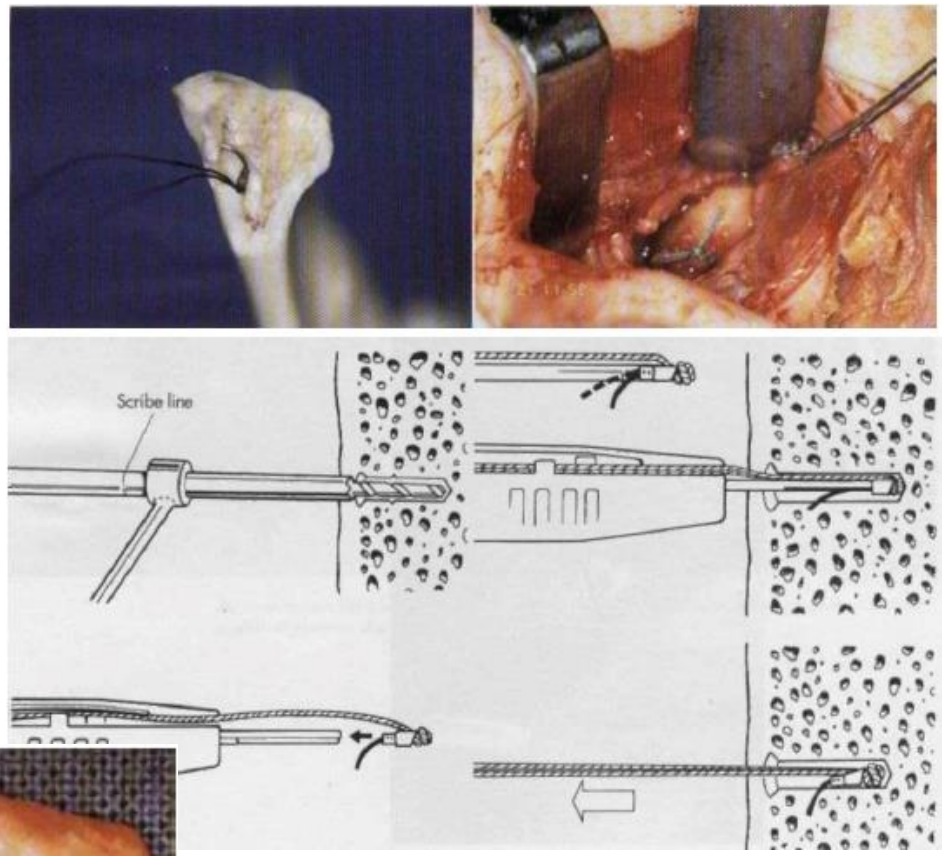
- Complications:
  - Réankylose
  - 2ème site opératoire
  - Réactions corps étranger



Discorrhaphie



Discopexie

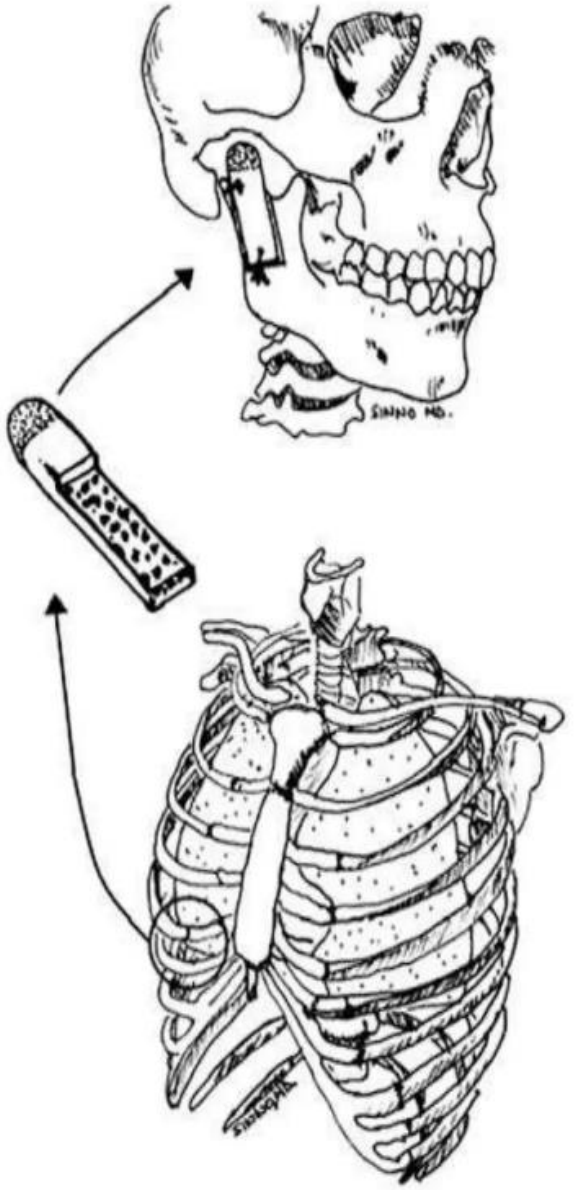


Discectomie

Greffe Costochondrale

- Greffe autologue la plus utilisée
- Avantages:
  - Portion cartilagineuse
  - Potentiel de croissance
  - Accessible et adaptable
  - Similarité anatomiques

- Limitations:
  - Croissance incertaine
  - Faible qualité osseuse
  - Complications site donneur
  - Réankylose: 5-39% des cas



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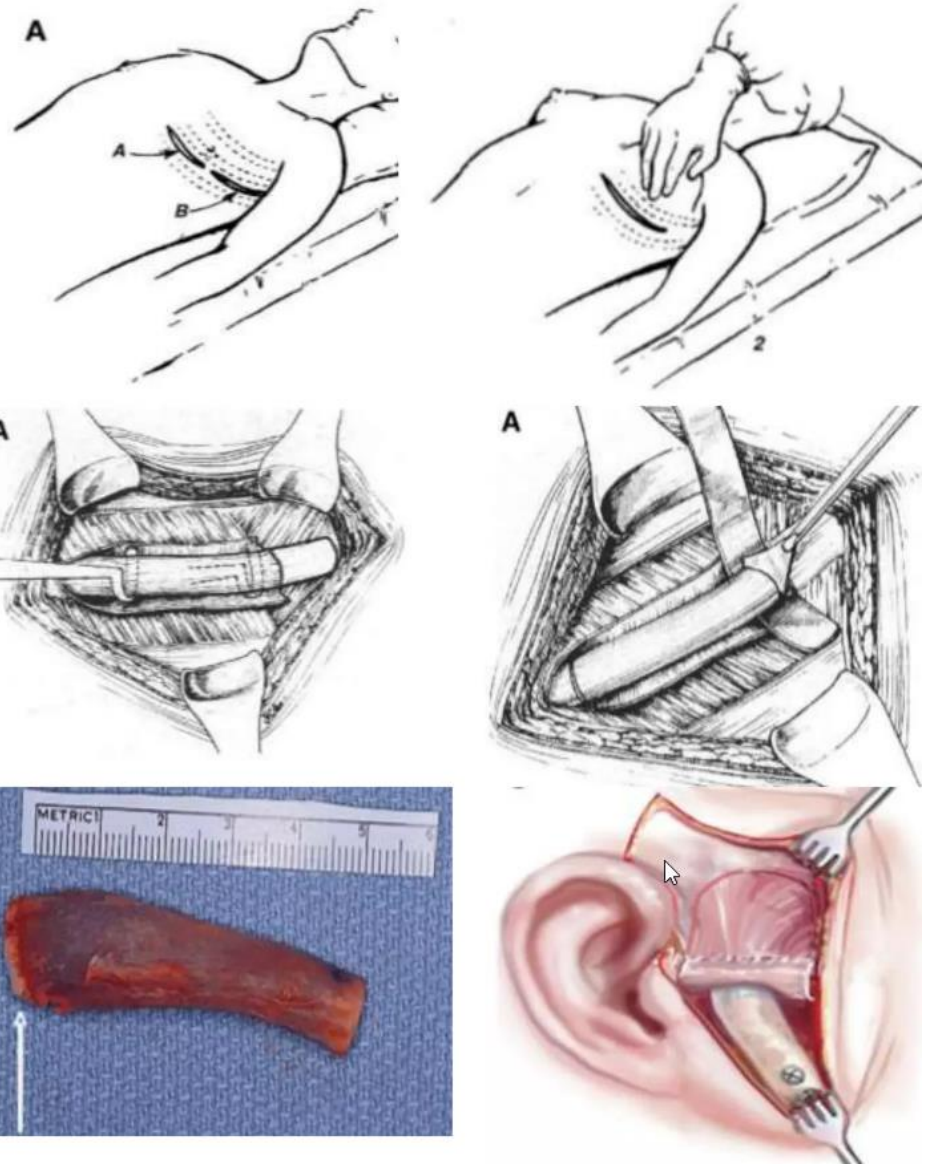
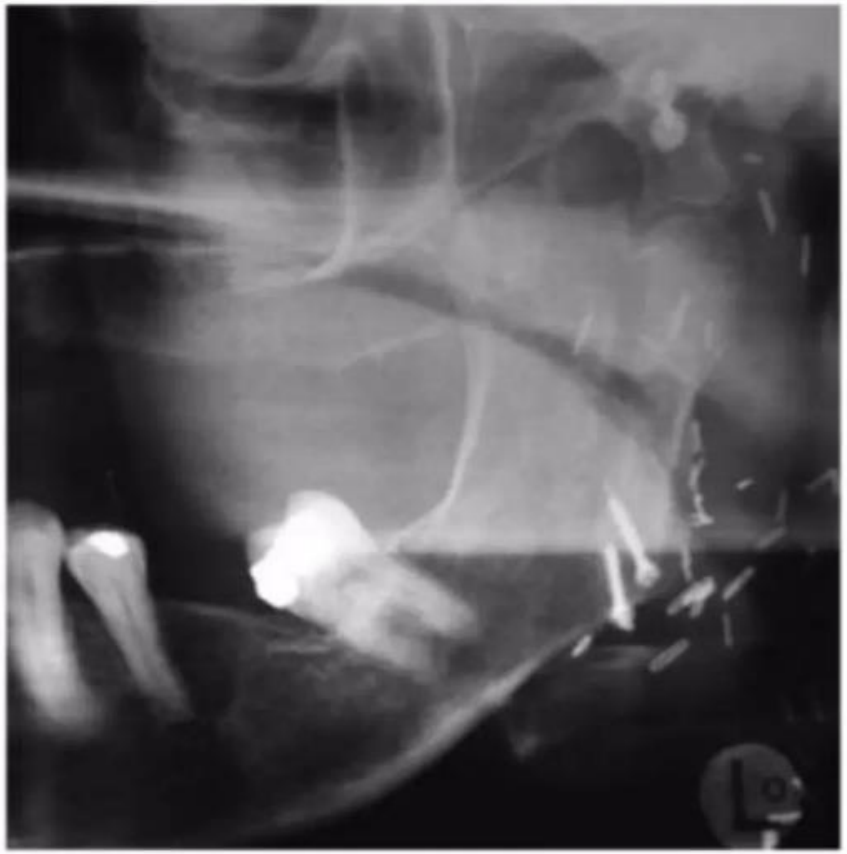


Lambeau osseux microvascularisé

- 2ème orteil
- Avantages:
  - Os + cartilage
  - Potentiel de croissance
  - Similarité taille
- Limitations:
  - Limitation mouvements
  - Perte orteil…



(Potter JK, Dierks EJ. Vascularized options for reconstruction of the mandibular condyle. InSeminars in plastic surgery 2008 Aug (Vol. 22, No. 03, pp. 156-160). © Thieme Medical Publishers.)

Alternatives

- Condylectomie
- Condylotomie
- Interposition tissu (fascia, muscle, graisse)
- Greffe de côte
- Lambeau osseux (péroné)