

REGIONE DEL VENETO



**ULSS2**  
MARCA TREVIGIANA

**VI JORNADAS NACIONALES ATM**

**ESTADIOS AVANZADOS  
DE LESIÓN INTERNA DE ATM:  
¿QUÉ HACER?**

2 y 3 de marzo de 2023

Edificio Siglo XXI  
Badajoz



**ATM**

**Cirugía abierta:  
DISCECTOMÍA**

**AZIENDA ULSS 2 Marca Trevigiana**

**Unit of Oral and Maxillofacial Surgery**

*Chief: Dott. Luca Guarda Nardini*

*Direttore Centro Regionale Disfunzioni Articolazione Temporo-Mandibolare*





# TMD



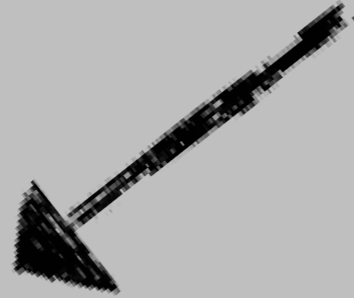
**PAIN  
!!!**

**&**

**LOSS OF  
FUNCTION**



# THERAPEUTIC RATIONALE OF DEGENERATED TMJs- By Step



## NON SURGICAL

- Physiotherapy
- Pills
- Pep talk, counseling
- Psychology
- Plates
- BruxApp and behavioral hygiene

## SURGICAL

## INVASIVE



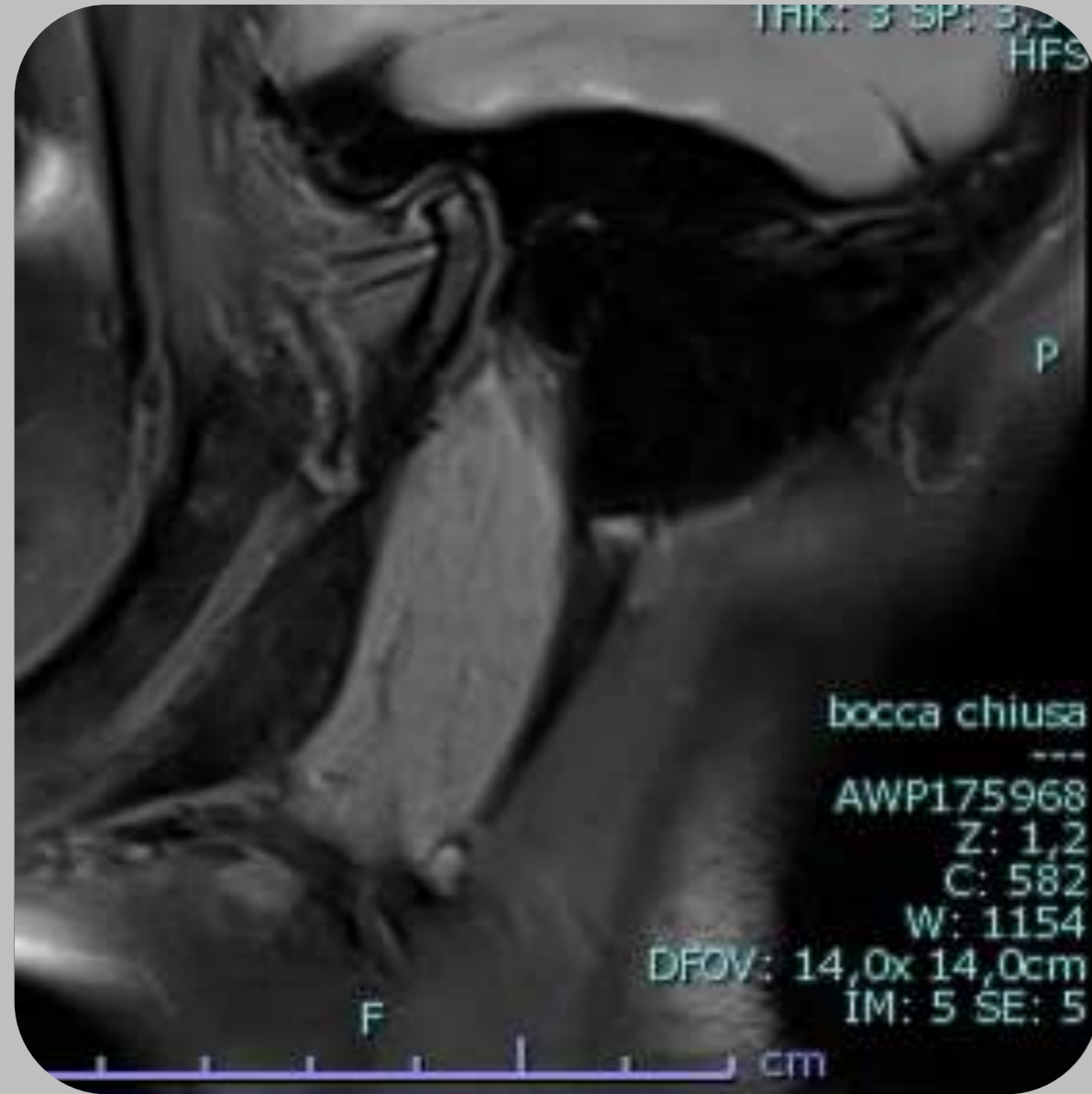
## MICRO INVASIVE

- Arthrocentesis with **hyaluronic acid** infiltration
- Arthrocentesis with **corticosteroid** infiltration
- Arthrocentesis with **human amniotic membrane (HAM)** infiltration

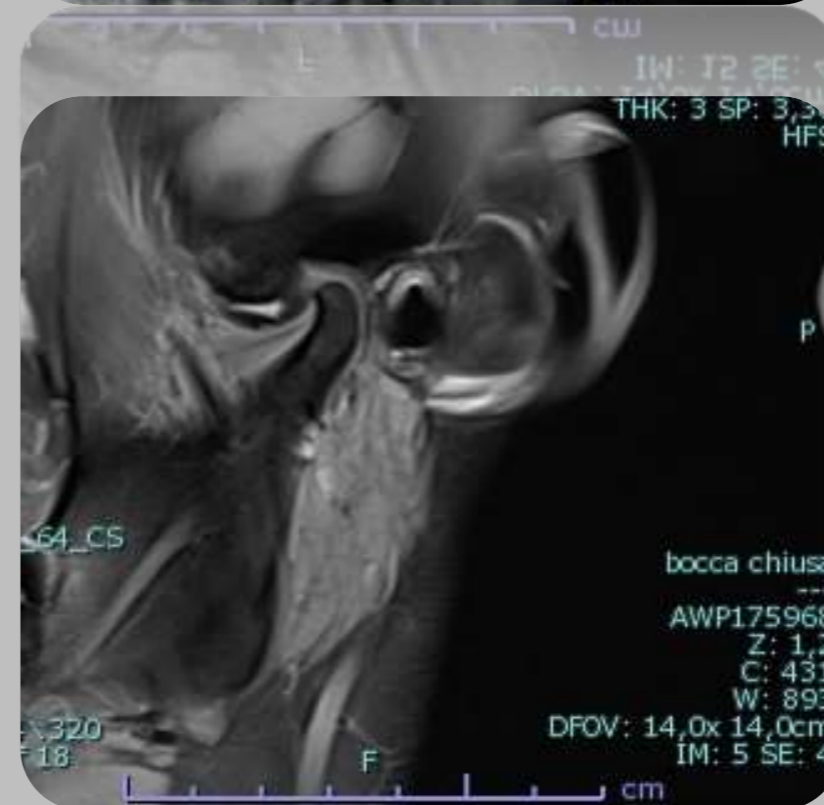
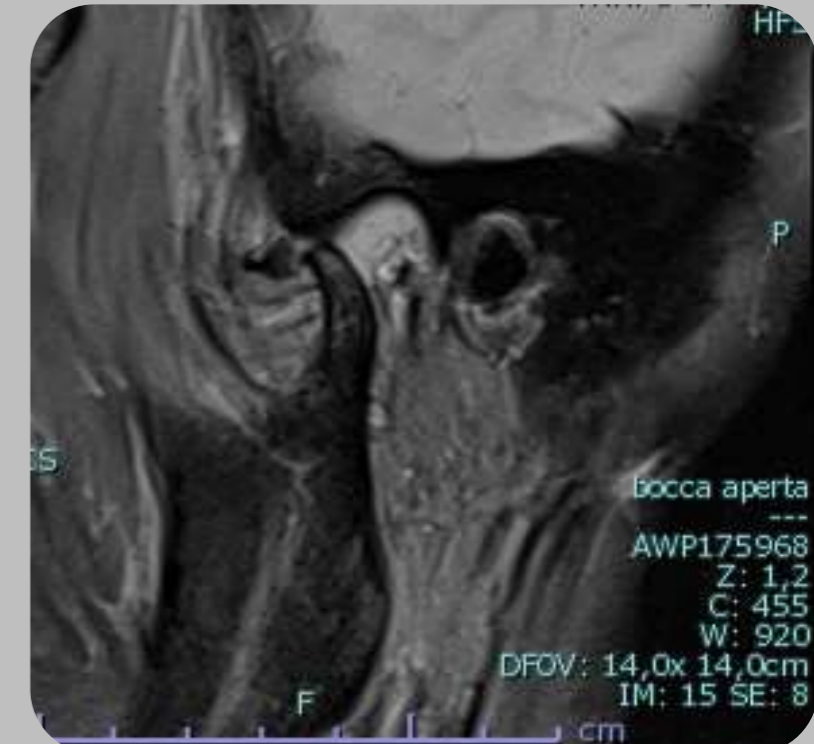
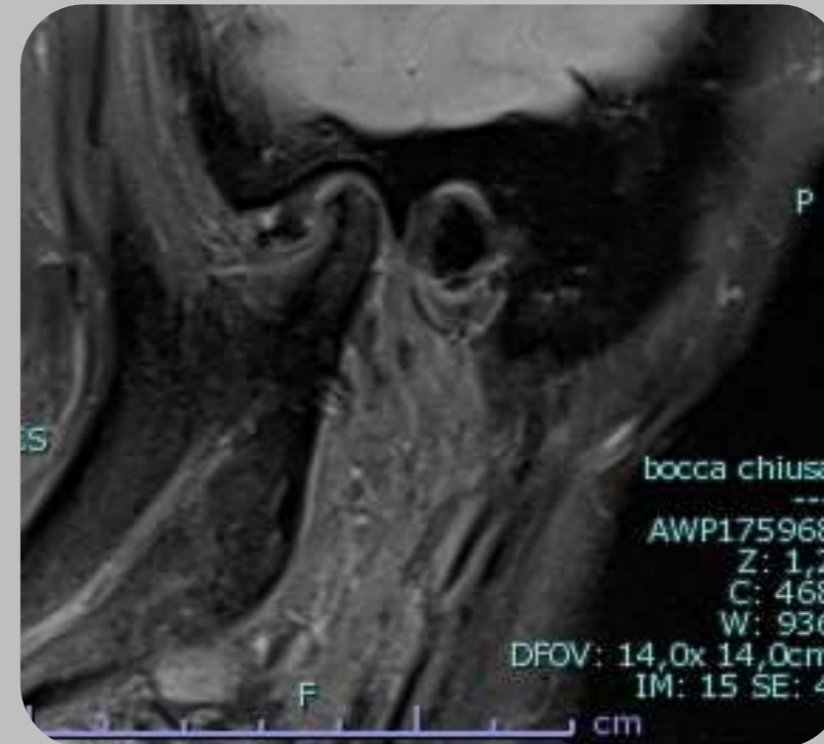




# How could THESE DISKS be recaptured?



*VS*





# How could THESE DISKS be recaptured?





# What about histopathology of the removed disk?



**Guarda Nardini L, Meneghini M, Guido M, Bacciorri F, Manfredini D.**

Histopathology of the temporomandibular joint disc: Findings in 30 samples from joints with degenerative disease.

J Oral Rehabil. 2021 Sep;48(9):1025-1034. doi: 10.1111/joor.13218. Epub 2021 Jul 9. PMID: 34185892; PMCID: PMC8456827.

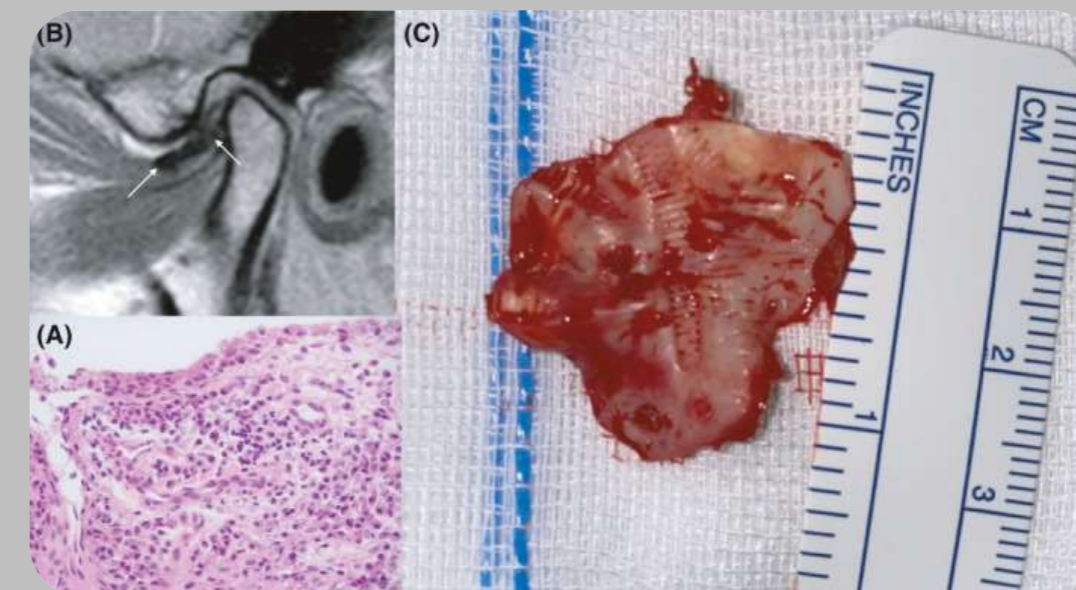


# Selection of the patients

- Departments of Oral and Maxillofacial Surgery of the Hospital of Treviso, Italy
- It received the approval of the local Ethical Committee.
- The sample included a total of 30 articular discs extracted from 22 patients, with ARTHROSIS aged between 24 and 68 years



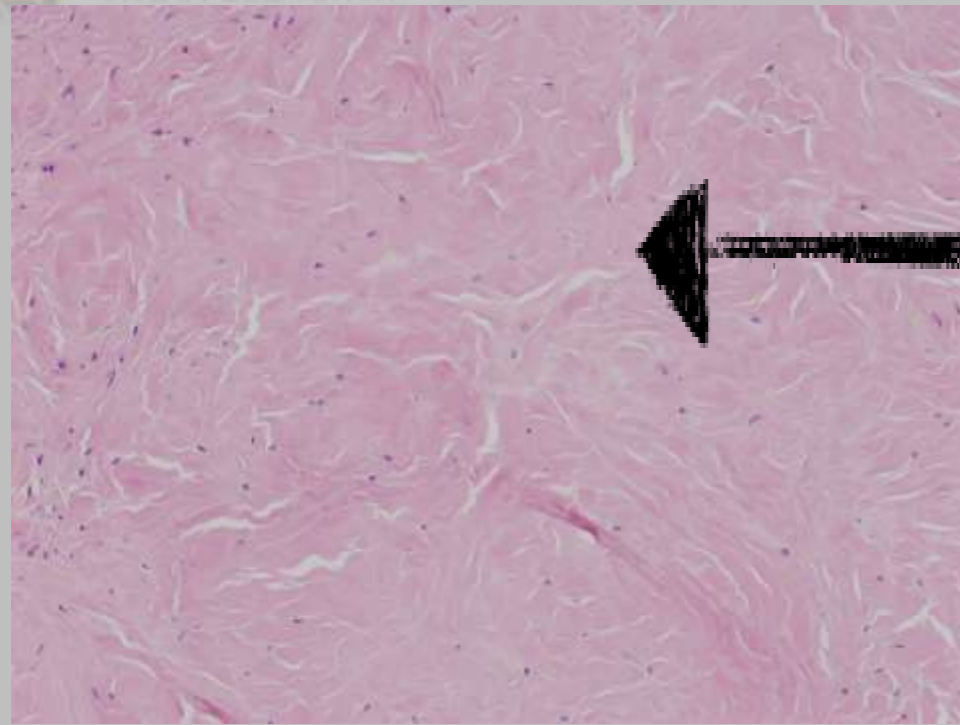
Histological findings show in the right side synovial proliferation with inflammation and highly vascularised tissue (haematoxylin-eosin stain, original magnification 40x) (A). On the left side severe myxoid degeneration is shown as deposition of amorphous basophilic substance, with microcystic degeneration (arrow; haematoxylin-eosin stain. Original magnification 60x) (B). MRI in the frontal view shows bilateral effusion (C). Surgical specimens show a broken right disc (D) and severely deformed left disc (E).



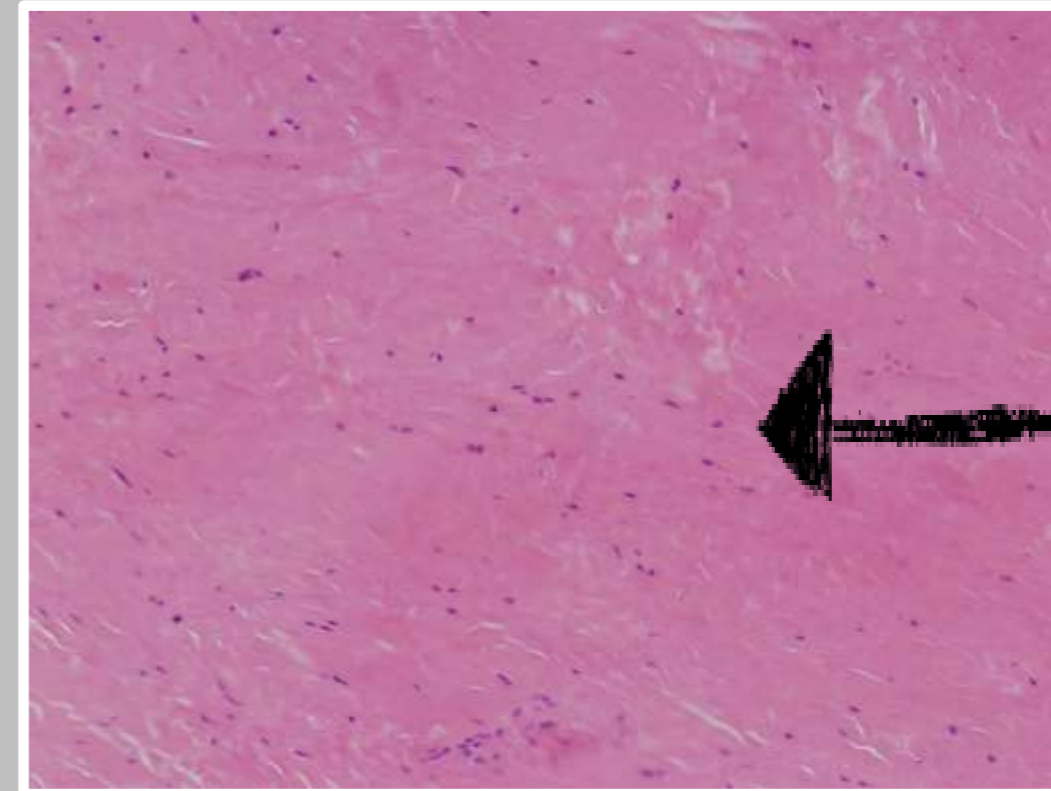
Mild-moderate lymphoplasmacellular subsynovial inflammation is visible histologically (arrow; haematoxylin eosin stain. Original magnification 60x) (A). MRI in the sagittal view shows a displaced disc and a large amount of inflammatory fluid in the antero-superior joint compartment (B). Surgical specimen of a plicated and deformed disc (C).



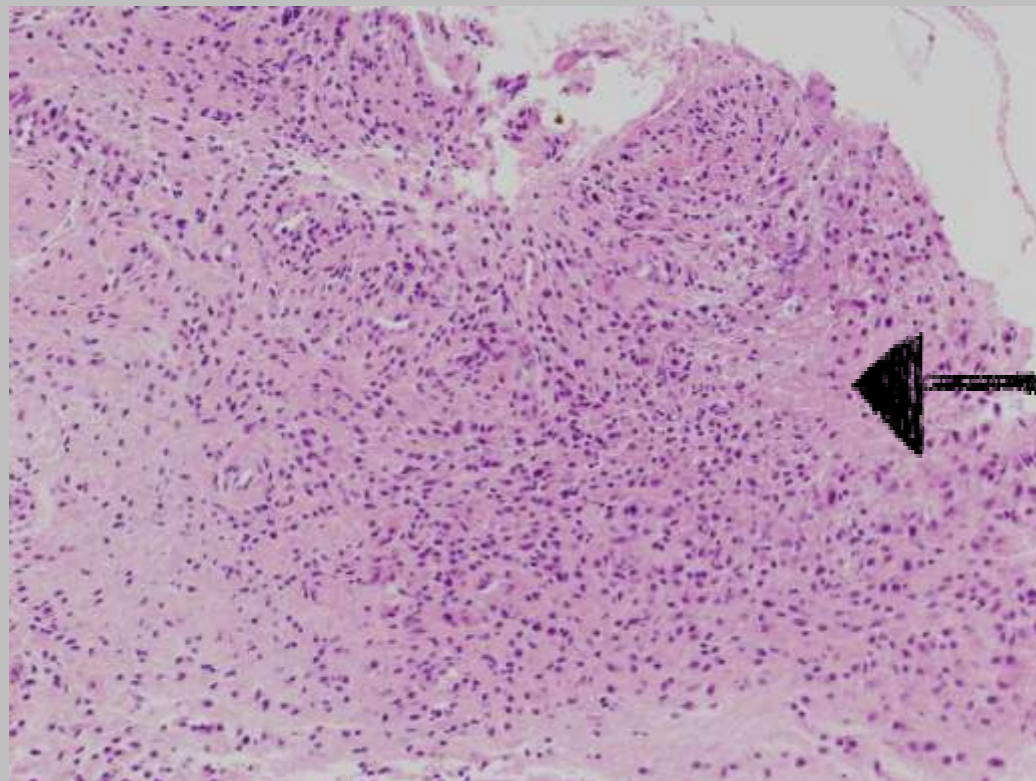
# TMJ disc: fibrocartilage tissue in Hematoxylin-Eosin stain



Normal disc tissue :  
**chondrocytes** are scattered among the **collagen fibers** as isolated cells, or in isogenic groups



Degeneration: fibrous tissue and **hyaline sclerosis** with abnormally **increased collagen deposition**

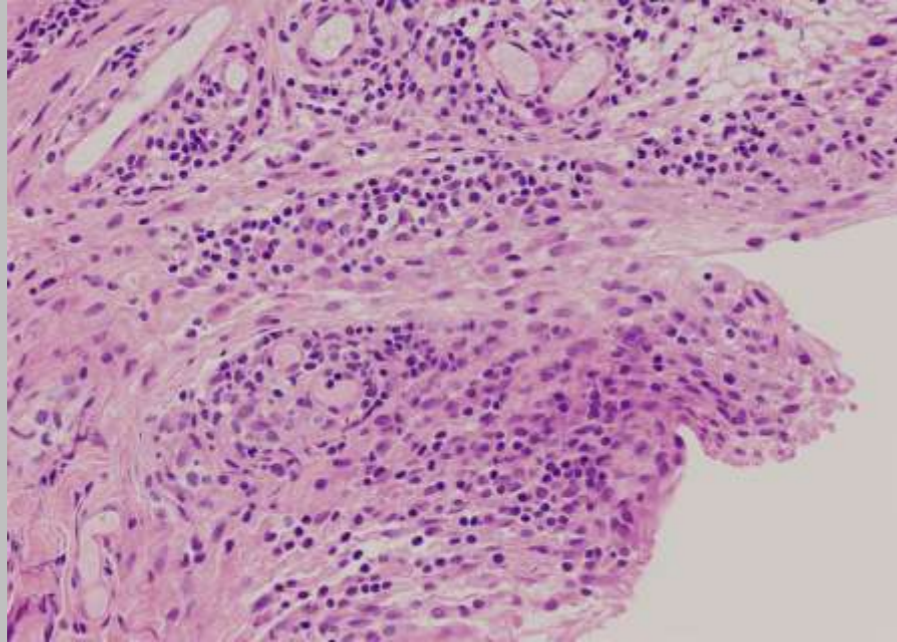


Synovitis with **microvascular proliferation** and increased cellularity, presence of **lymphocytes**, **histiocytes** and **plasma cells**

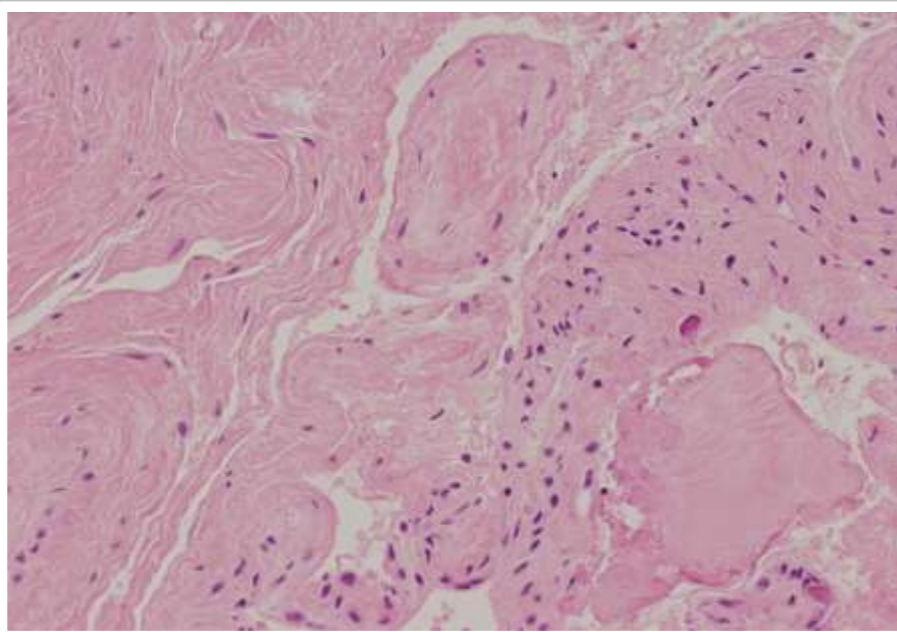




# Loss of the normal pattern



Vacuolization and abnormal cell proliferation, presence of lymphocytes and plasma cells



Presence of calcifications.  
Myxoid degeneration and collagen deposits

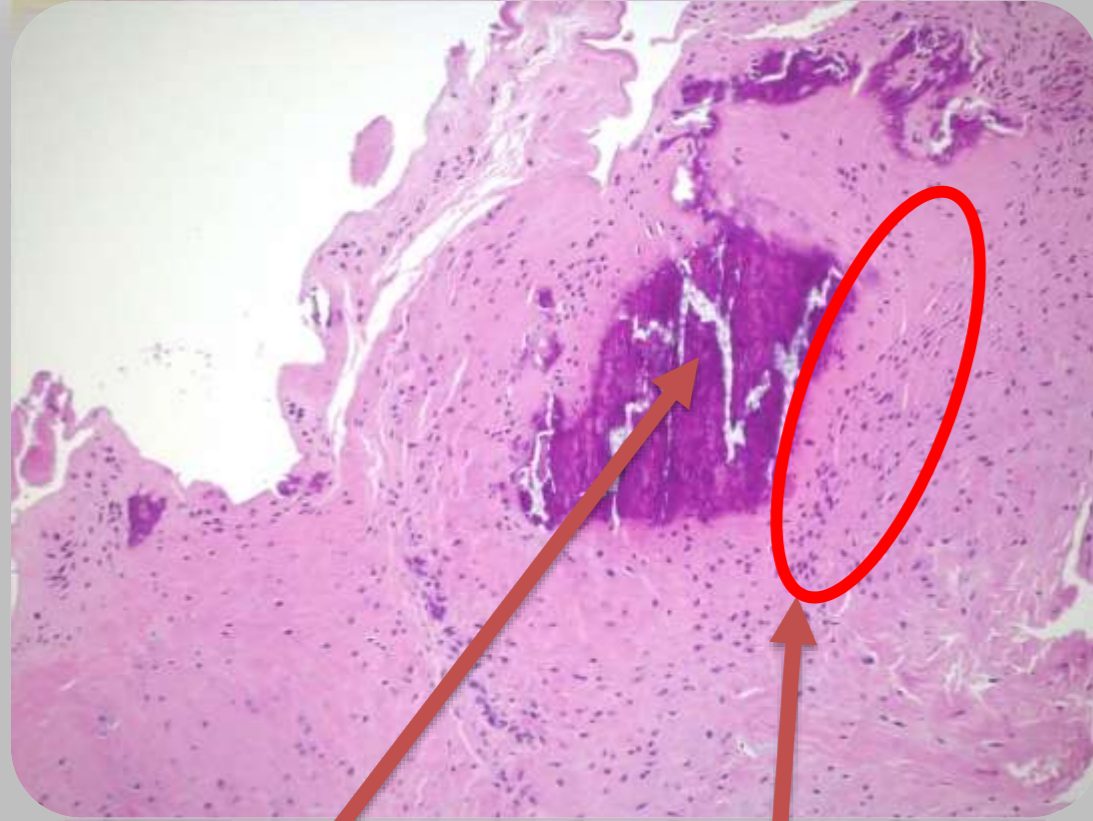


# Which is the histology of a repositioned disk?



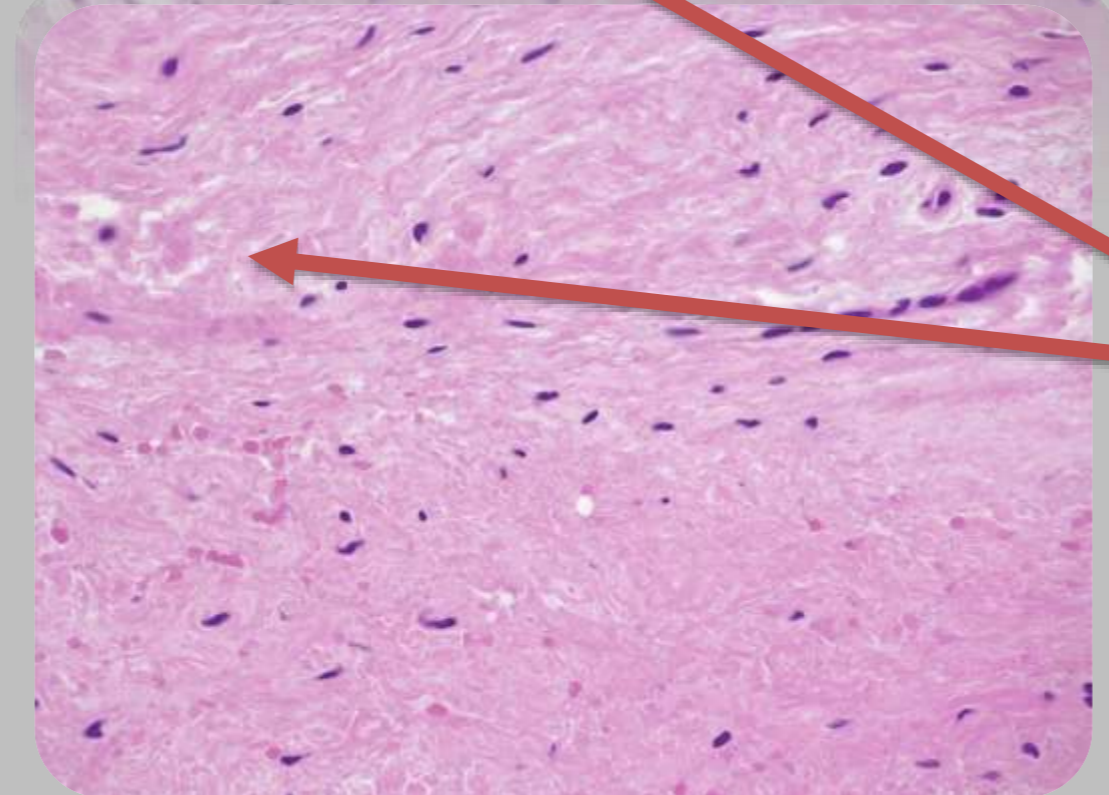
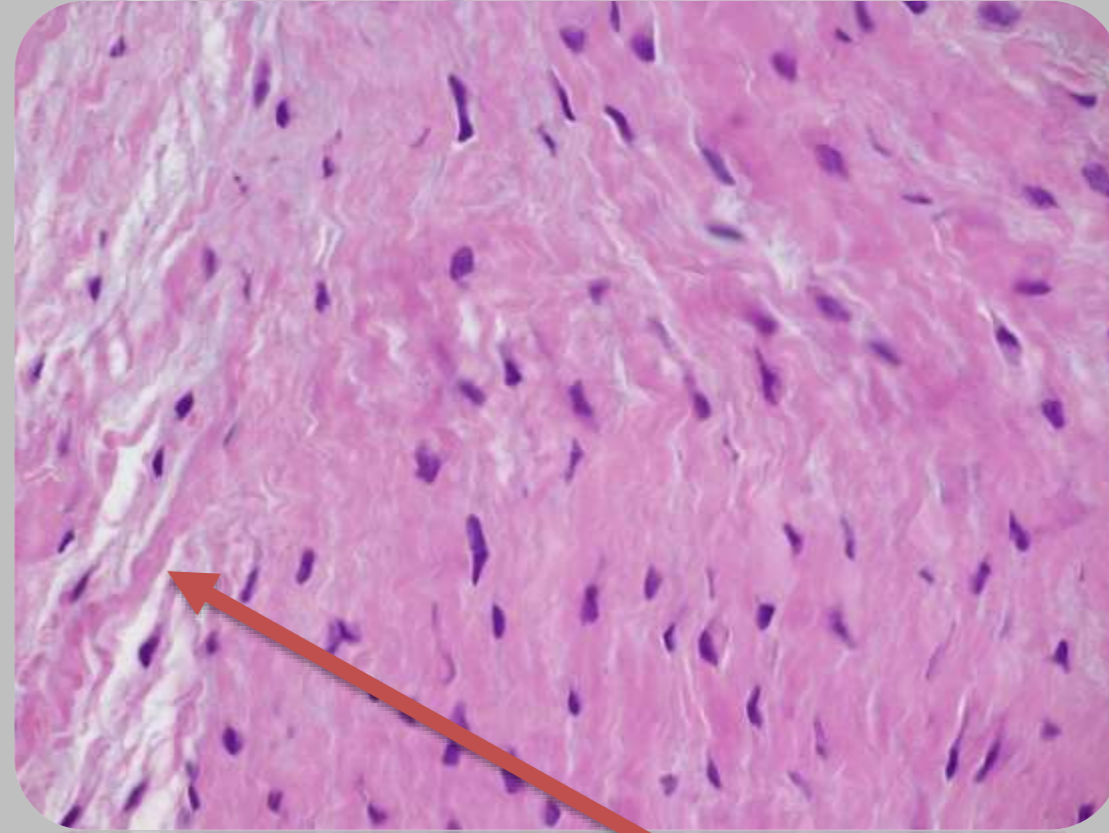


# Which is the hystology of a repositioned disk?

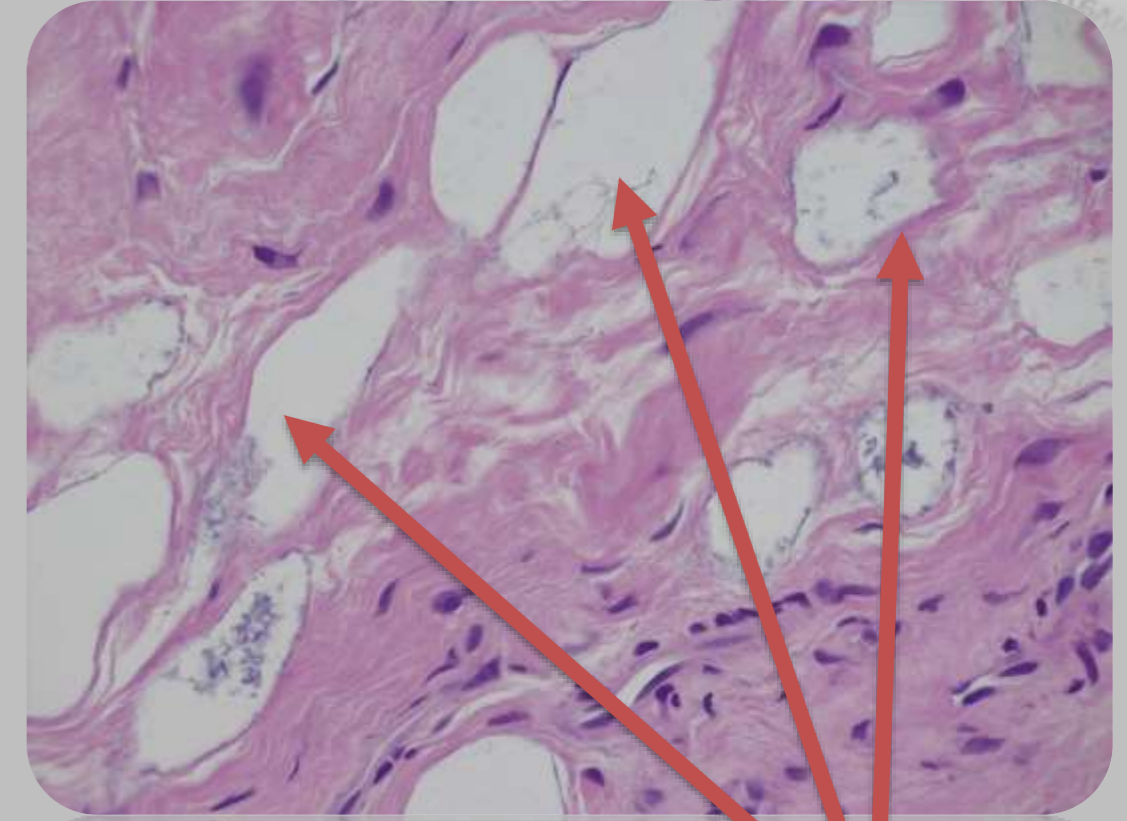


**Calcification**

**Chondroid metaplasia**



**Mixoid degeneration**



**Mixoid degeneration with pseudocyst**



# Results 30 Discs

The main findings of the macroscopical evaluation concern the presence of :

- ❖ 16 hypotrophic and severely worn discs,
- ❖ 14 discs fragmented in several parts, and a perforated disc.
- ❖ **MORPHOLOGICAL ALTERATIONS**, with deformation and degenerative signs, **WERE SHOWN IN ALL DISCS.**



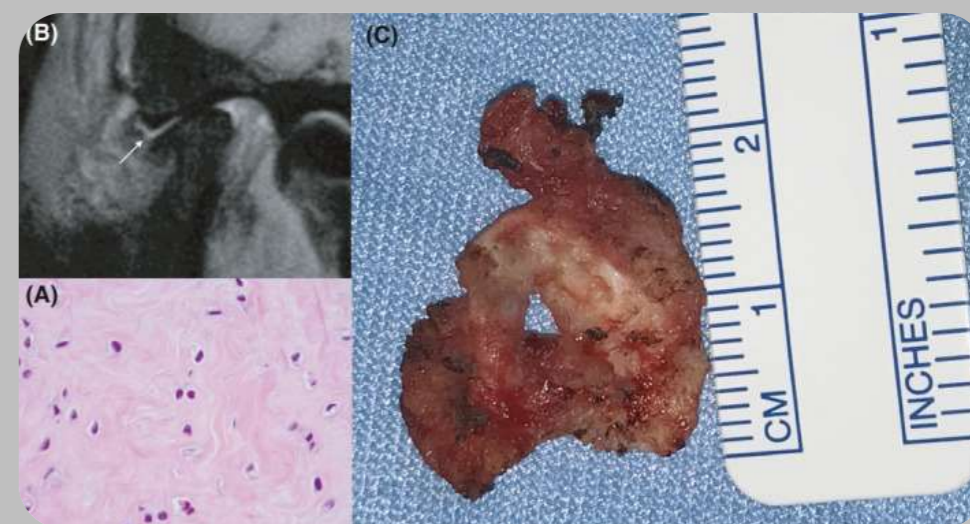
# Results 30 Discs

Hematoxylin-eosin staining allowed to highlight important histological changes:

- Histological changes characteristic of an initial arthrosic alteration, **with MIXOID DEGENERATION and COLLAGEN DEPOSIT, which usually precedes fibrous sclerosis, were shown in 25 samples;**
- An increase in **FIBRO-HYALINE and FIBROUS TISSUES, with loss of elasticity, which indicates a more advanced stage of degeneration, was shown in 25 samples;**
- **SYNOVIAL INFLAMMATION** was shown in 18 samples.
- **CALCIFICATIONS** were shown in 15 samples;
- **NO DISC WAS FREE FROM MULTIPLE HISTOLOGICAL CHANGES**



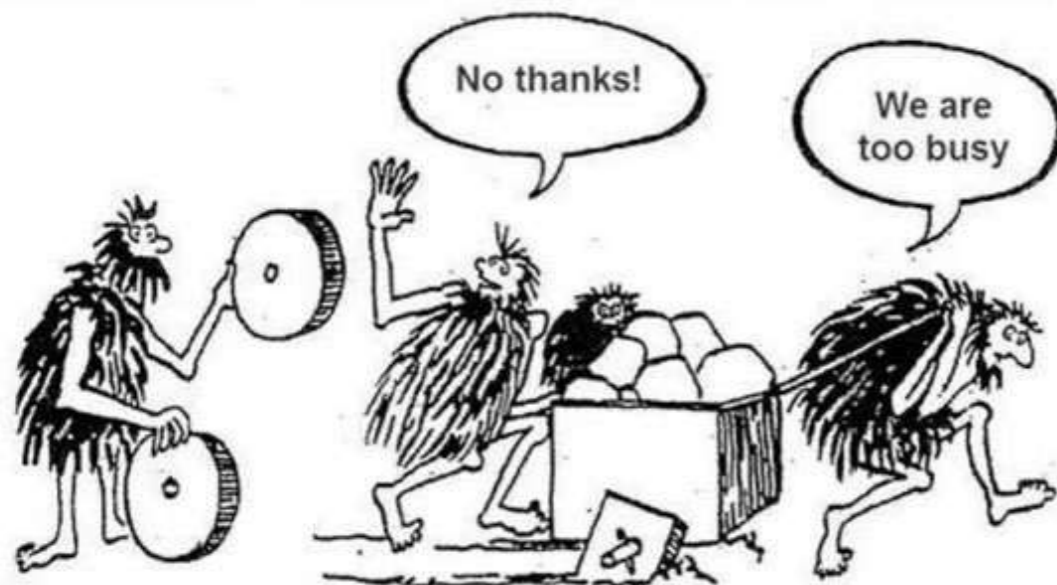
Myxoid degeneration is shown as deposition of amorphous basophilic substance (arrow; haematoxylin eosin stain. Original magnification 20x; insert 60x) (A). MRI shows a displaced disc with initial signs of fragmentation (B). Surgical specimen of a fragmented disc (C)



Chondroid metaplasia. Several chondrocytes are evident (arrow; haematoxylin eosin stain. Original magnification 60x) (A). MRI in the sagittal view shows inflammatory fluid as well as severe disc degeneration, with direct contact between the glenoid fossa and the condylar head (B). Perforation of the disc is visible in the surgical specimen (C)



There is no physiological basis for recapturing a disk if it has lost its macroscopic and microscopic anatomical identity... It just **DOESN'T WORK**.



● Chronic pain and lost of mandibular function with DDWOR

● **FIRST LINE TREATMENT:**  
1) Non surgical (Physiotherapy, Pep talk, Plates...)  
2) Mini-invasive (Arthrocentesis)

● **NO IMPROVEMENT IN PAIN AND DISFUNCTION:**  
- Surgical treatment (Disk removal)



# Conclusion

This histological and anatomical study of joints with severe degeneration showed that:

- **Patients who are candidates for TMJ surgery present a worn or even perforated disc.**
- **TMJ surgery is required in severely degenerated joints**, total discectomy appears as the most reasonable approach based on the histopathological findings of TMJ disc alteration.
- **THE SURGICAL CHOICE TO PRESERVE AND REPOSITION THE DISC** is interesting, but **IS INCONSISTENT** because contrast with joint the physiology , **with the evidence of the irreversibility of disc degeneration** itself and with disease progression

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**WHAT IS THE SOLUTION WE  
PROPOSE?**





# Before it was...



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# Now - Human Amniotic Membrane





# Human Amniotic Membrane

## Proprieties:

- **PROGENIOGENETIC EFFECT**
- **ANTI-INFLAMMATORY EFFECT**
- **ANTI-MICROBIC EFFECT**
- **ANTI-APOPTOTIC EFFECT**
- **FAVORES CELLULAR EPITELIZATION AND DIFFERENTIATION**
- **REDUCTION OF PAIN AND MINOR NEED FOR MEDICATION**

## Uses:

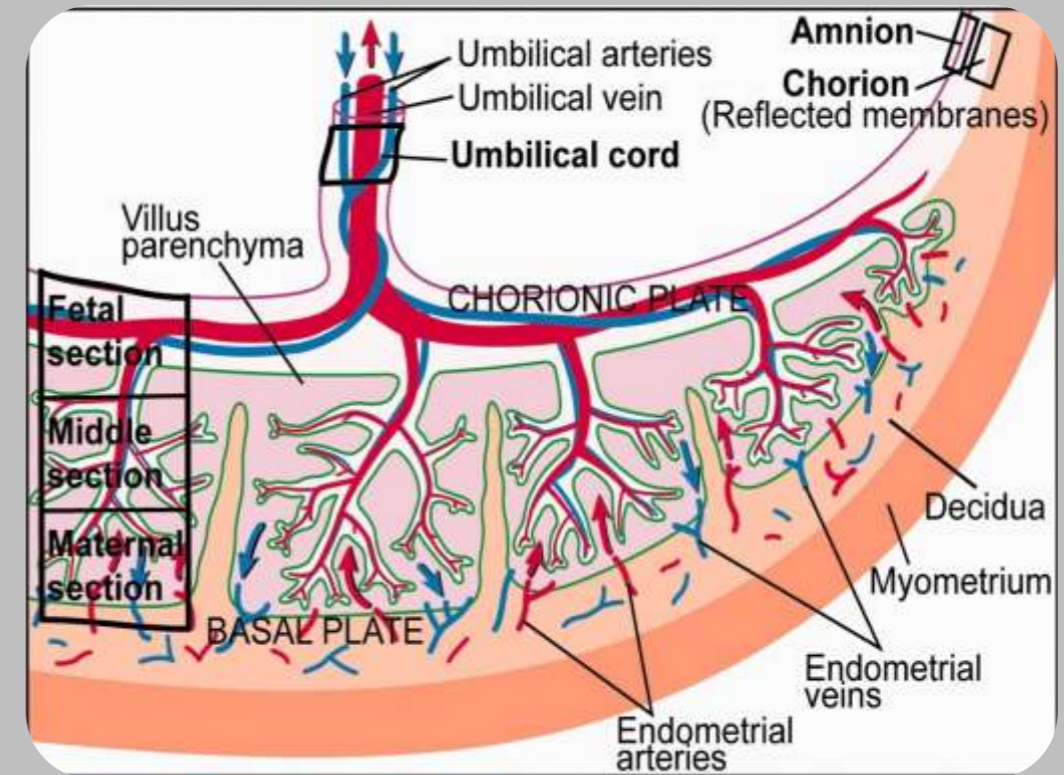
- **OCULAR PATHOLOGY**
- **BURNS**
- **CHRONIC ULCERS**
- **RECONSTRUCTION**
- **ARTICULAR PATHOLOGIES**
- **NERVE-sparing**





# HAM Growth Factors

- **Epidermal Growth Factor (EGF)**
- Epidermal growth factor promotes the proliferation of epithelial cells.
- **Transforming Growth Factor Beta  $\beta$  (TGF- $\beta$ )**
- A transformant growth factor plays an anti-inflammatory action, favoring the normal healing process of wounds and reduced scar formation.
- **Fibroblast Growth Factor (FGF)**
- Fibroblast growth factor favors cell proliferation and plays an important role in the formation of collagen matrix.
- **Platelet Derived Growth Factors A & B (PDGF A & B)**
- Growth factor derived from platelets A and B promotes cell proliferation in connective tissue and stimulates the healing of soft tissues.

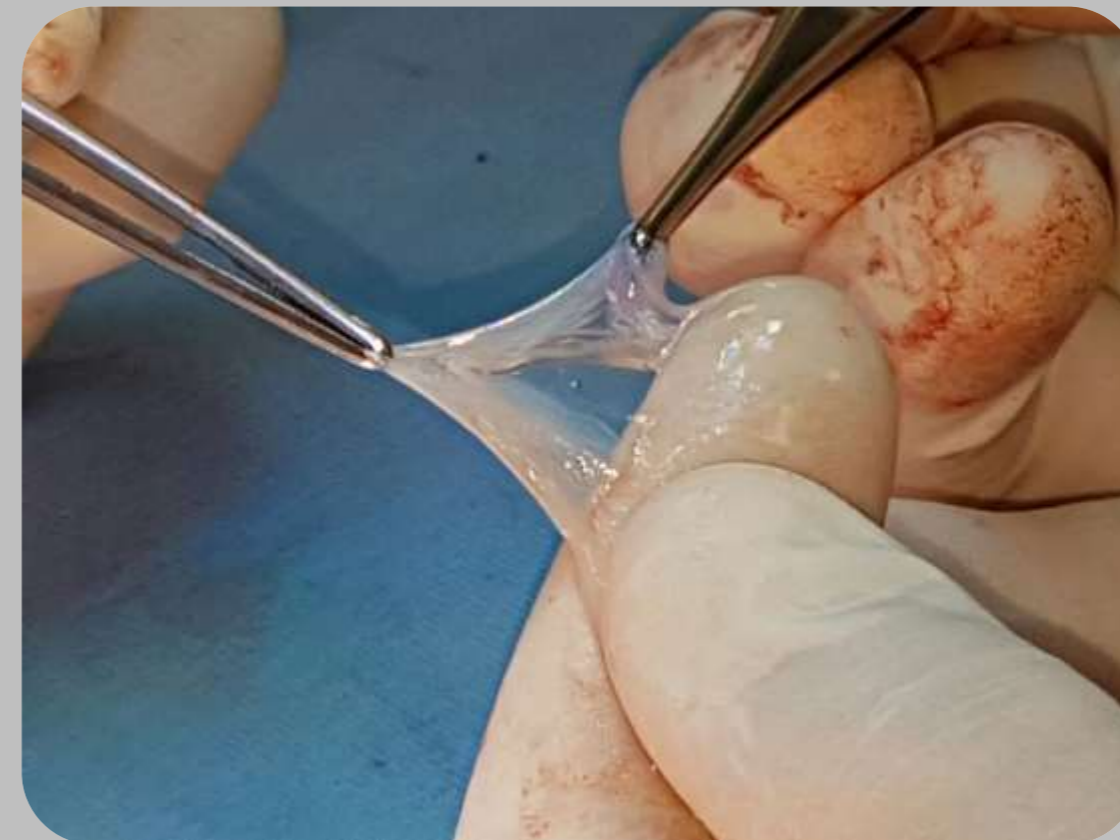




# Hospital of Treviso



The Fondazione “Banca dei Tessuti Onlus” of the Hospital of Treviso deals with the collection of tissues and the amniotic membrane, respecting strict regulations and operating procedures.

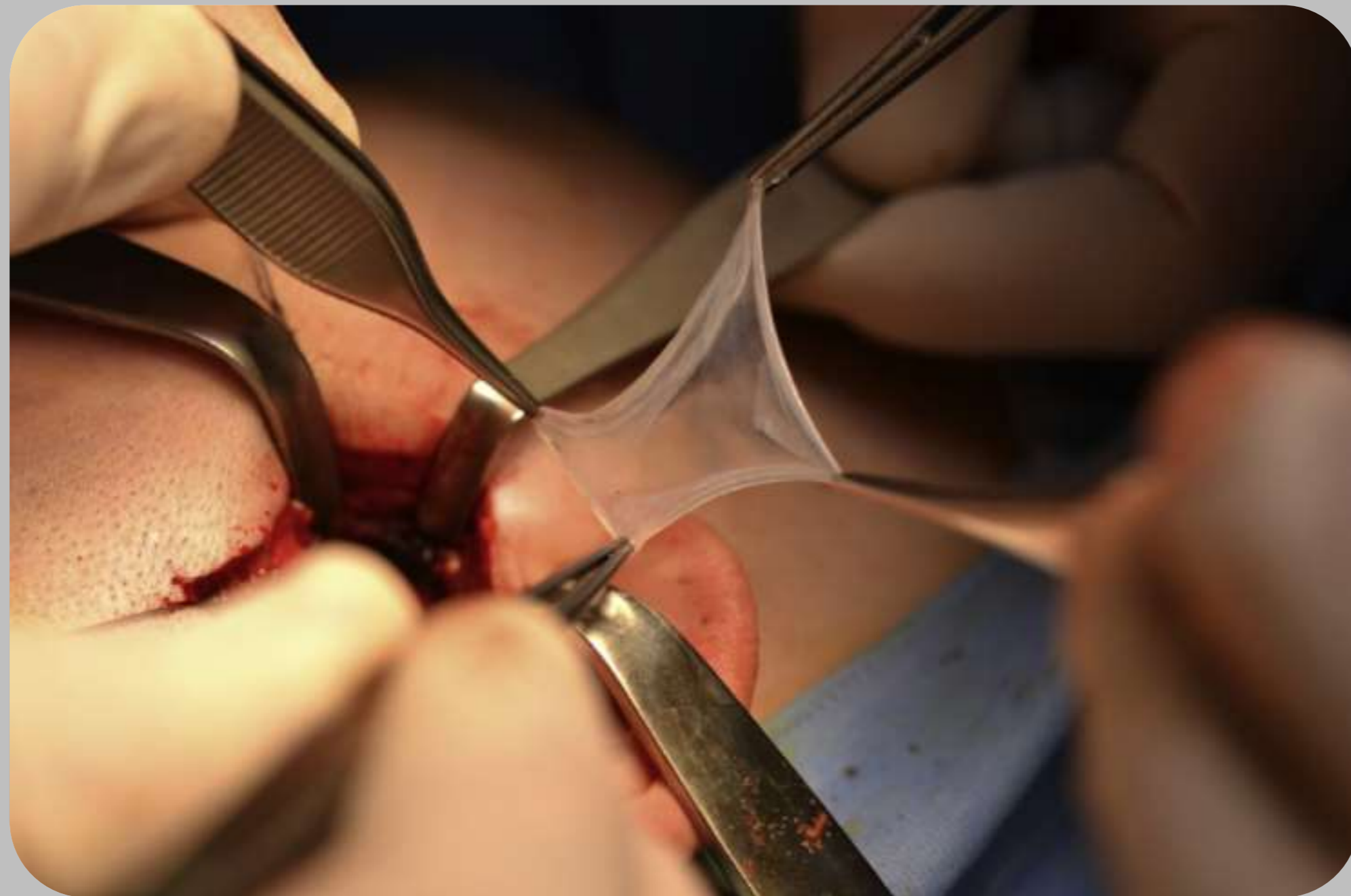


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# Could the Human Amniotic Membrane be the future in TMJ surgery ?





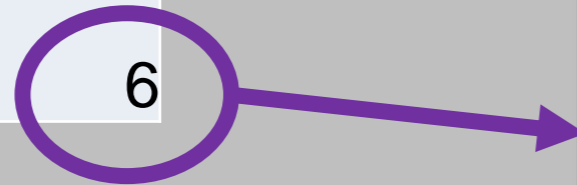
# HAM IN TMJ SURGERY



N°	Sex M:F	Age	Follow-up (months)
48	7:41	52,04±15,2	9,96

- All patients were managed conservatively before opting for surgery (oral splint, physiotherapy, Ecological Momentary Assessment of Awake Bruxism with BRUXAPP)
- 24 patients underwent arthrocentesis with viscosupplementation without improvement before surgery

Diagnosis	N°
Artrosis with DDWOR	37
Recurrent closed lock with DDWOR	5
Retreatment of previous surgery	6



6 patients come to Our Structure after previous surgical treatment:

- 1 patient underwent meniscectomy with insertion of a goretex membrane
- 4 patients underwent to surgical disk repositioning
- 1 patients underwent retrodiscal tissue cauterization in arthroscopy

\*DDWOR: Disk dislocation without reduction



# Follow-up of patients treated with meniscectomy and HAM

- Statistically better management of pain after surgery (less painkillers) ( $P < 0,05$ )
- 4 (8,3%) Patients which did not follow correct physiotherapy after surgery show relapse of functional limitation, pain and arthrosis. They were successfully re-treated 3 with arthroplasty and HAM, 1 with TMJ custom prothesis





# Follow-up of patients treated with meniscectomy and HAM

- 70,8% of patient improve mouth opening in 7 days after surgery,
- 91% of Patients **did not show** spontaneous pain, pain at chewing and speaking after 1 month from surgery
- 4 patients demonstrated a temporary (<6 months) unilateral deficit of the frontal branch of the facial nerve and 1 demonstrated a permanent unilateral deficit

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# TMJ OSTEOARTHRITIS AMNIOTIC MEMBRANE



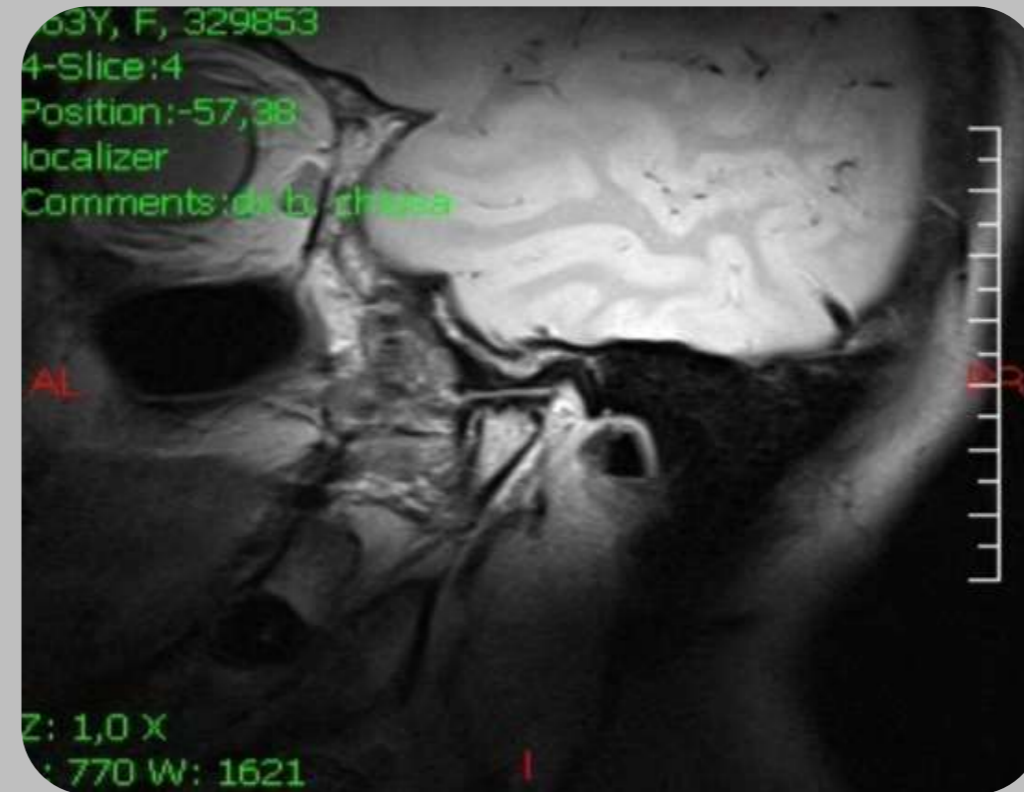
# SURGICAL

## Severe arthrosic degeneration with irreversible compromise of the articular disc



### MICRO INVASIVE

*Already performed a cycle of **five arthrocentesis and infiltration of hyaluronic acid**. Poor results due to the severity of the degeneration: after 2 months the pain persists and the mouth is insufficiently open.*



### INVASIVE

*Meniscectomy  
Condyloplasty  
Amniotic membrane replacement*

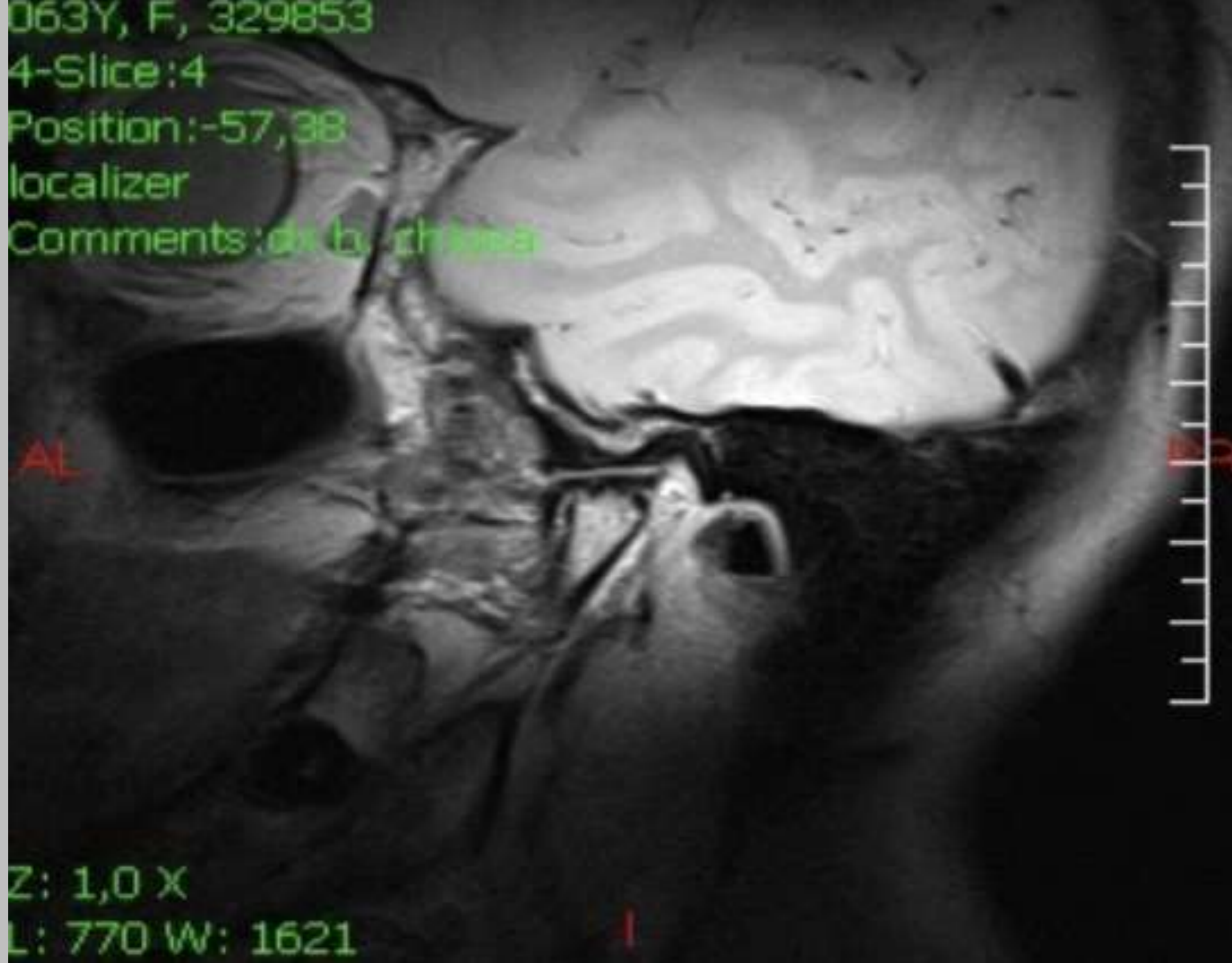


PATIENT SUFFERING  
FROM OSTEOARTHRITIS  
OF THE RIGHT TMJ WITH  
SEVERE PAIN AND  
DYSFUNCTION OF THE  
MANDIBLE TREATED  
WITH POOR RESULTS  
WITH A CICLE OF  
FIVE ARTHROCENTESIS  
AND HYALURONIC ACID  
INFILTRATION





MRI:  
OSTEOARTHRITIS





# TREATMENT FORMS: PRE AND POST HYALURONIC ACID

## INFILTRAZIONI INTRARTICOLARI: SCHEDA DI RILEVAZIONE ATM

Cognome e Nome del paziente: [REDACTED]

INFILTRAZIONE/CONTROLLO: I Inf. Art. dx DATA: 20.12.11

Capacità masticatoria: capacità di masticare il cibo da un minimo di 0 (impossibilità a masticare e sola assunzione di cibi semiliquidi) ad un massimo di 10 (capacità masticatoria ottimale di qualsiasi tipo di cibo)

Capacità masticatoria: valore 0

Dolore al movimento: presenza/assenza di dolore durante i normali movimenti mandibolari (masticazione dei cibi, fonazione) da un minimo di 0 (assenza di dolore), ad un massimo di 10 (dolore insopportabile)

Dolore alla masticazione: valore minimo 4 valore massimo 8

Dolore alla fonazione: valore minimo 4 valore massimo 8

Dolore a riposo: presenza/assenza del dolore mentre non si compiono movimenti mandibolari, da un minimo di 0 (assenza di dolore) ad un massimo di 10 (dolore insopportabile)

Dolore a riposo: valore minimo 6 valore massimo 6

Grado di limitazione funzionale: limitazione della funzionalità nelle normali attività di masticazione, fonazione, ecc.

0=nessuna 1=lieve 2=moderata 3=intensa 4=grave

Giudizio di efficacia del paziente: beneficio rilevato dal paziente in seguito all'infiltrazione

0=scarsa 1=lieve 2=moderata 3=buona 4=ottima

Giudizio di tollerabilità: livello di tollerabilità dell'infiltrazione

0=scarsa 1=lieve 2=moderata 3=buona 4=ottima

Apertura della bocca pre-infiltrazione: spontanea 30 forzata 32  
lateralità dx 3 protrusione 2 lateralità sin 4

INFILTRAZIONE/CONTROLLO: I Art. dx DATA:

Capacità masticatoria: capacità di masticare il cibo da un minimo di 0 (impossibilità a masticare e solo cibi semiliquidi) ad un massimo di 10 (capacità masticatoria ottimale di qualsiasi tipo di cibo)

Capacità masticatoria: valore 0

Dolore al movimento: presenza/assenza di dolore durante i normali movimenti mandibolari (masticazione, fonazione) da un minimo di 0 (assenza di dolore), ad un massimo di 10 (dolore insopportabile)

Dolore alla masticazione: valore minimo 6 valore massimo 8

Dolore alla fonazione: valore minimo 6 valore massimo 8

Dolore a riposo: presenza/assenza del dolore mentre non si compiono movimenti mandibolari, da un minimo di 0 (assenza di dolore) ad un massimo di 10 (dolore insopportabile)

Dolore a riposo: valore minimo 6 valore massimo 6

Grado di limitazione funzionale: limitazione della funzionalità nelle normali attività di masticazione, fonazione, ecc.

0=nessuna 1=lieve 2=moderata 3=intensa 4=grave

Giudizio di efficacia del paziente: beneficio rilevato dal paziente in seguito all'infiltrazione

0=scarsa 1=lieve 2=moderata 3=buona 4=ottima

Giudizio di tollerabilità: livello di tollerabilità dell'infiltrazione

0=scarsa 1=lieve 2=moderata 3=buona 4=ottima

Apertura della bocca pre-infiltrazione: spontanea 30 forzata 35  
lateralità dx 4 protrusione 3 lateralità sin 4

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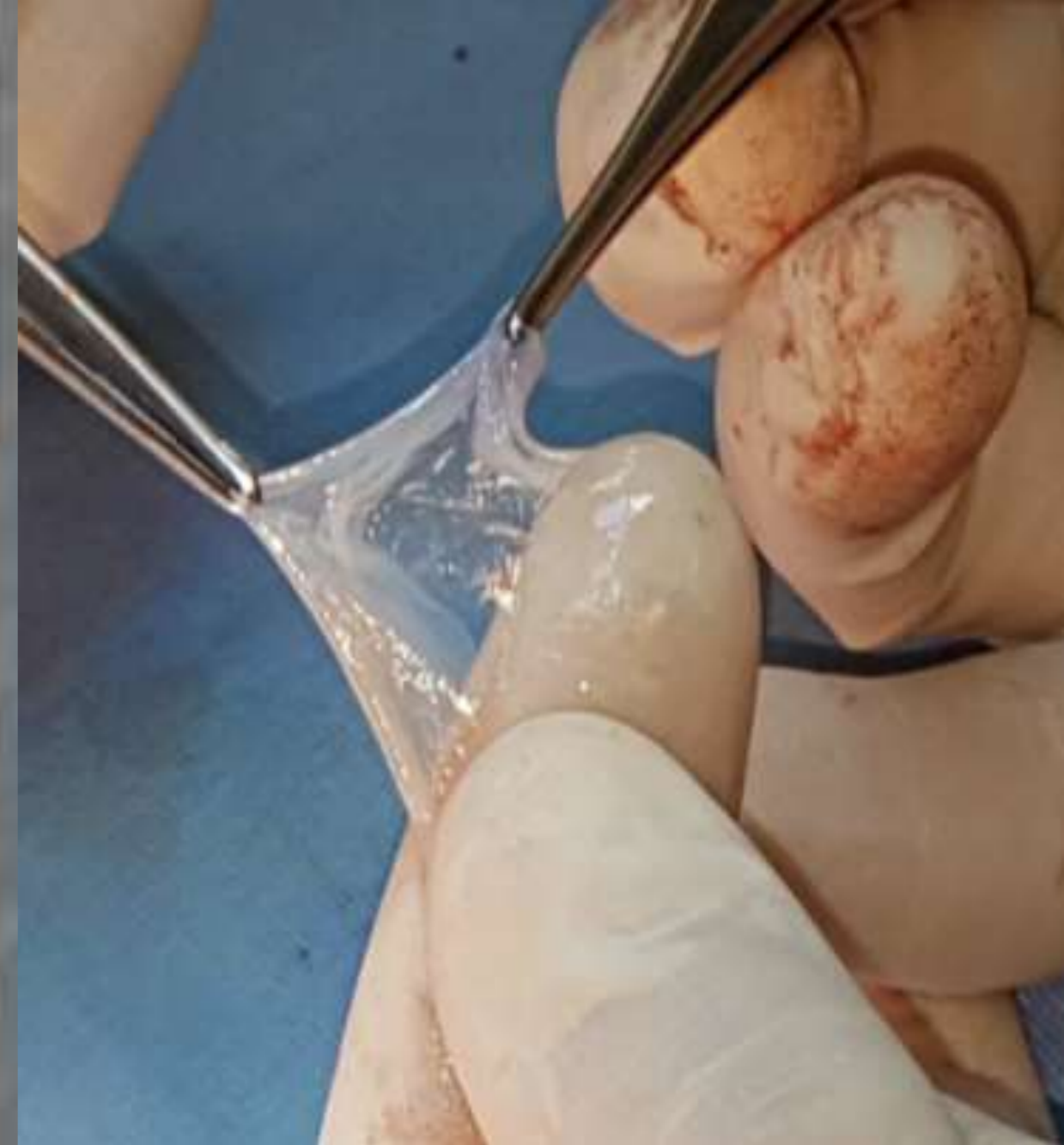
# PREAURICULAR INCISION





JOINT EXPOSURE AND POSITIONING  
OF THE PINS FOR THE DISTRACTOR





AMNIOTIC MEMBRANE



THE MEMBRANE IS PLACED INTO THE JOINT ON THE TOP OF THE CONDYLE

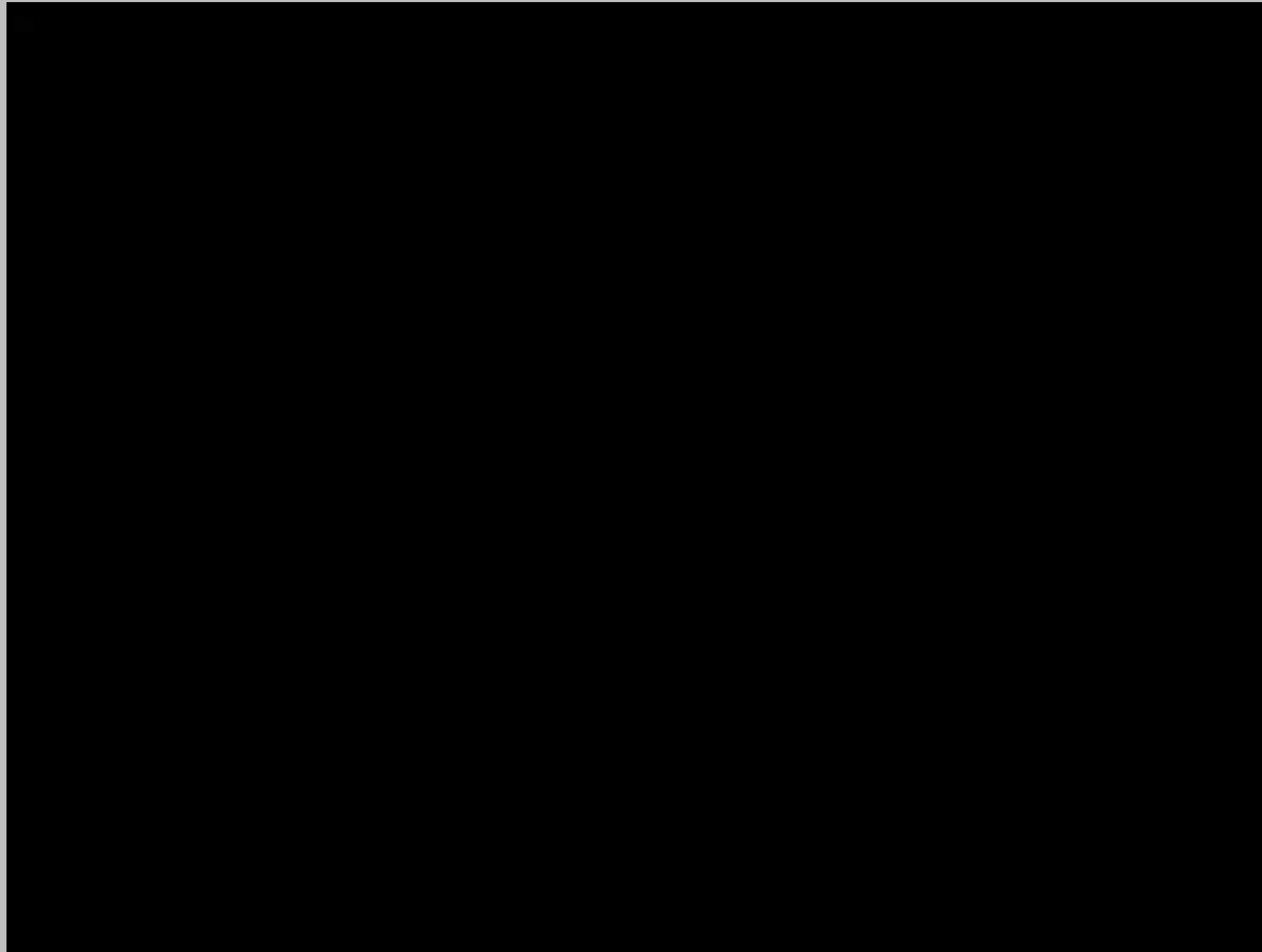


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# PLACEMENT OF AMNIOTIC MEMBRANE



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# SIX WEEKS AFTER SURGERY



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SIX  
WEEKS  
AFTER  
SURGERY





# FORMS: SIX WEEKS AFTER SURGERY

INFILTRAZIONE/CONTROLLO: A 40 610 RM 17/15/2011 DATA: 31-5-17

Capacità masticatoria: capacità di masticare il cibo da un minimo di 0 (impossibilità a masticare e sola assunzione di cibi semiliquidi) ad un massimo di 10 (capacità masticatoria ottimale di qualsiasi tipo di cibo)

➔ Capacità masticatoria: valore 6

Dolore al movimento: presenza/assenza di dolore durante i normali movimenti mandibolari (masticazione dei cibi, fonazione) da un minimo di 0 (assenza di dolore), ad un massimo di 10 (dolore insopportabile)

➔ Dolore alla masticazione: valore minimo 0 valore massimo 7  
Dolore alla fonazione: valore minimo 0 valore massimo 0

Dolore a riposo: presenza/assenza del dolore mentre non si compiono movimenti mandibolari, da un minimo di 0 (assenza di dolore) ad un massimo di 10 (dolore insopportabile)

➔ Dolore a riposo: valore minimo 0 valore massimo 4

Grado di limitazione funzionale: limitazione della funzionalità nelle normali attività di masticazione, fonazione, ecc.  
0=nessuna 1=lieve 2=moderata 3=buona 4=grave

Giudizio di efficacia del paziente: beneficio rilevato dal paziente in seguito all'infiltrazione  
0=scarso 1=lieve 2=moderata 3=buona 4=ottima

Giudizio di tollerabilità: livello di tollerabilità dell'infiltrazione  
0=scarso 1=lieve 2=moderata 3=buona 4=ottima

➔ Apertura della bocca pre-infiltrazione: spontanea 4.2 forzata 4.3  
lateralità dx 5 protrusione 3 lateralità sin 4

Apertura della bocca post-infiltrazione: spontanea ..... forzata .....  
lateralità dx ..... protrusione ..... lateralità sin .....

INFILTRAZIONE/CONTROLLO: IV A7 PK DATA: 31-1-17

Capacità masticatoria: capacità di masticare il cibo da un minimo di 0 (impossibilità a masticare e sola assunzione di cibi semiliquidi) ad un massimo di 10 (capacità masticatoria ottimale di qualsiasi tipo di cibo)

➔ Capacità masticatoria: valore 0

Dolore al movimento: presenza/assenza di dolore durante i normali movimenti mandibolari (masticazione dei cibi, fonazione) da un minimo di 0 (assenza di dolore), ad un massimo di 10 (dolore insopportabile)

➔ Dolore alla masticazione: valore minimo 6 valore massimo 8  
Dolore alla fonazione: valore minimo 6 valore massimo 8

Dolore a riposo: presenza/assenza del dolore mentre non si compiono movimenti mandibolari, da un minimo di 0 (assenza di dolore) ad un massimo di 10 (dolore insopportabile)

➔ Dolore a riposo: valore minimo 6 valore massimo 6

Grado di limitazione funzionale: limitazione della funzionalità nelle normali attività di masticazione, fonazione, ecc.  
0=nessuna 1=lieve 2=moderata 3=buona 4=grave

Giudizio di efficacia del paziente: beneficio rilevato dal paziente in seguito all'infiltrazione  
0=scarso 1=lieve 2=moderata 3=buona 4=ottima

Giudizio di tollerabilità: livello di tollerabilità dell'infiltrazione  
0=scarso 1=lieve 2=moderata 3=buona 4=ottima

➔ Apertura della bocca pre-infiltrazione: spontanea 3.0 forzata 3.5  
lateralità dx 4 protrusione 3 lateralità sin 3



# TAKE HOME MESSAGE

- Meniscectomy with HAM interposition is a simple and effective technique that has been shown to improve pain and dysfunction in patients affected by DDWOR unresponsive to conservative treatments (oral splints, arthrocentesis, physiotherapy...)
- The properties of HAM allow for better tissue healing and a less heavy post-operative period
- The risk of complications related to this technique is comparable to that of disc repositioning with the open technique



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**THANKS FOR YOUR ATTENTION !**



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