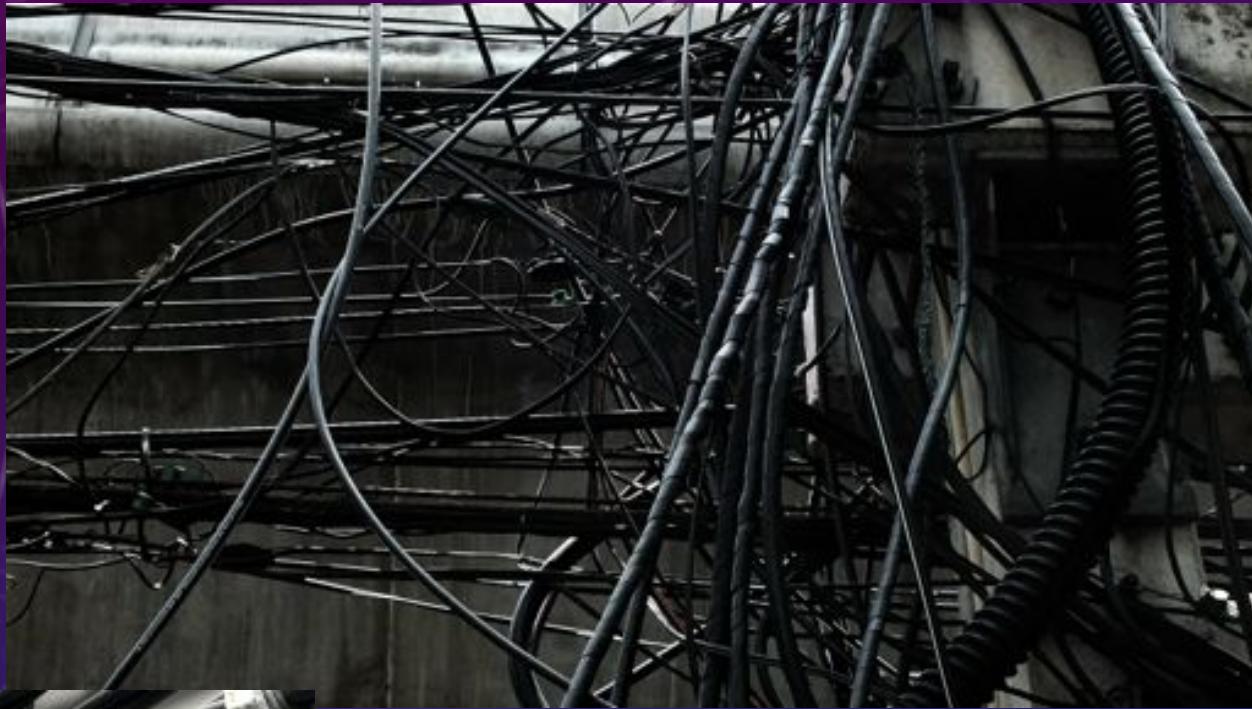
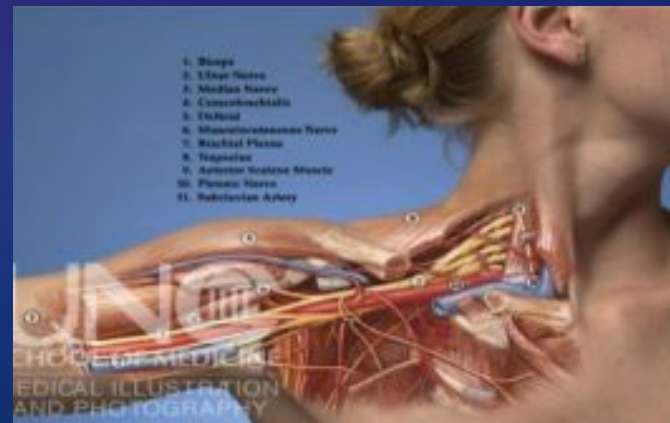




LE PLEXUS BRACHIAL



Dr PERIGNON Renan
Chef de clinique
CHU Clermont-Ferrand

PLAN DE LA PRÉSENTATION

- Anatomie
- Techniques d'exploration
- Technique de réalisation des imageries en coupes
- La pathologie

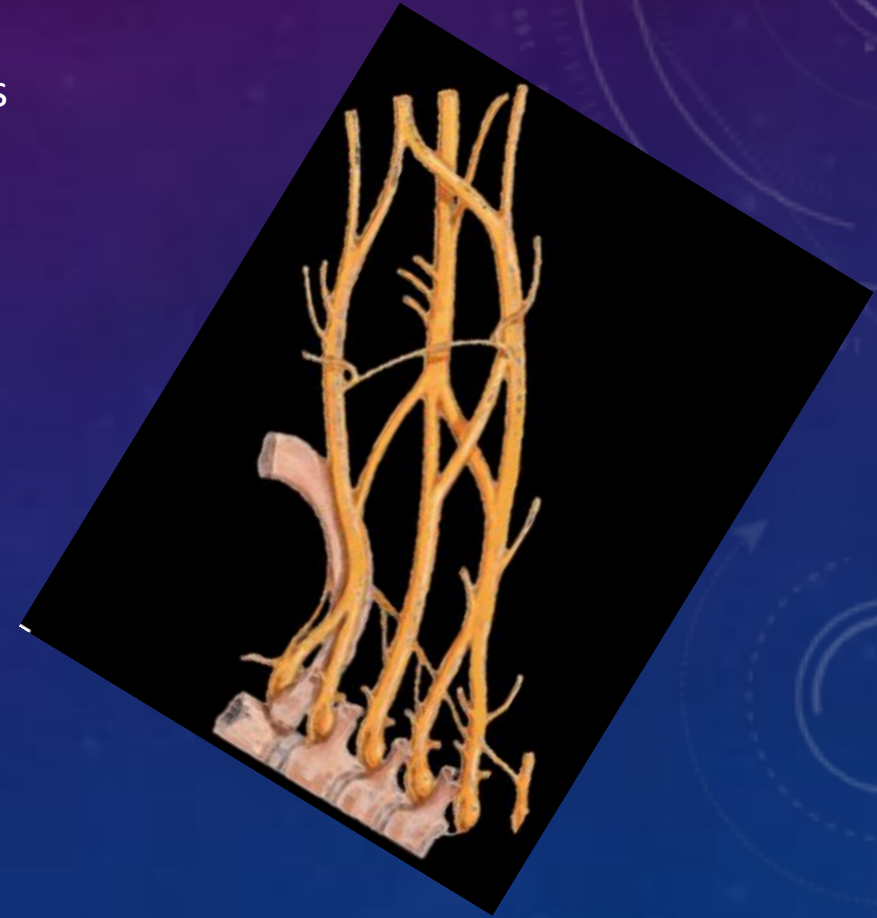


Branches terminales

Faisceaux

Troncs

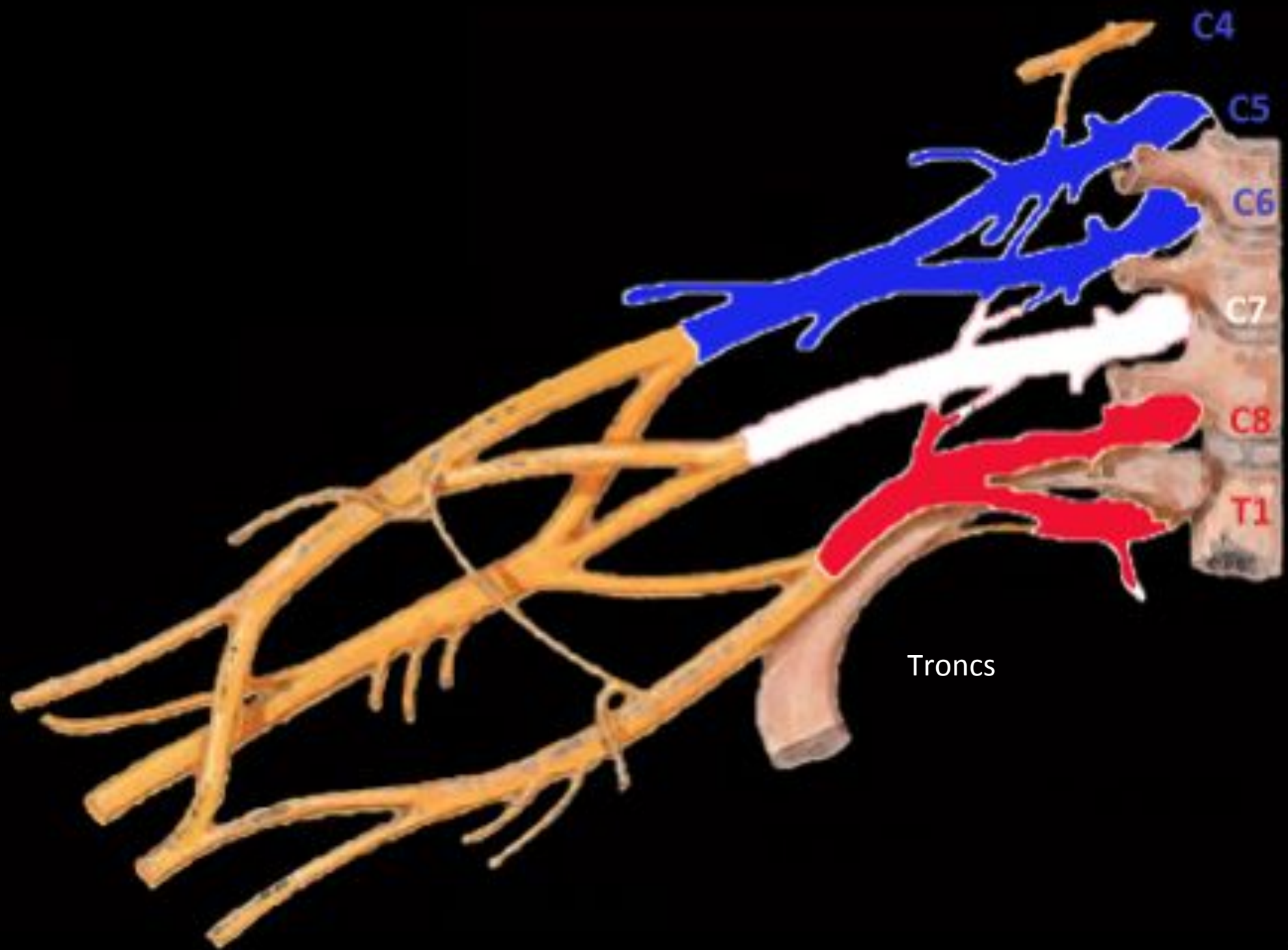
Racines



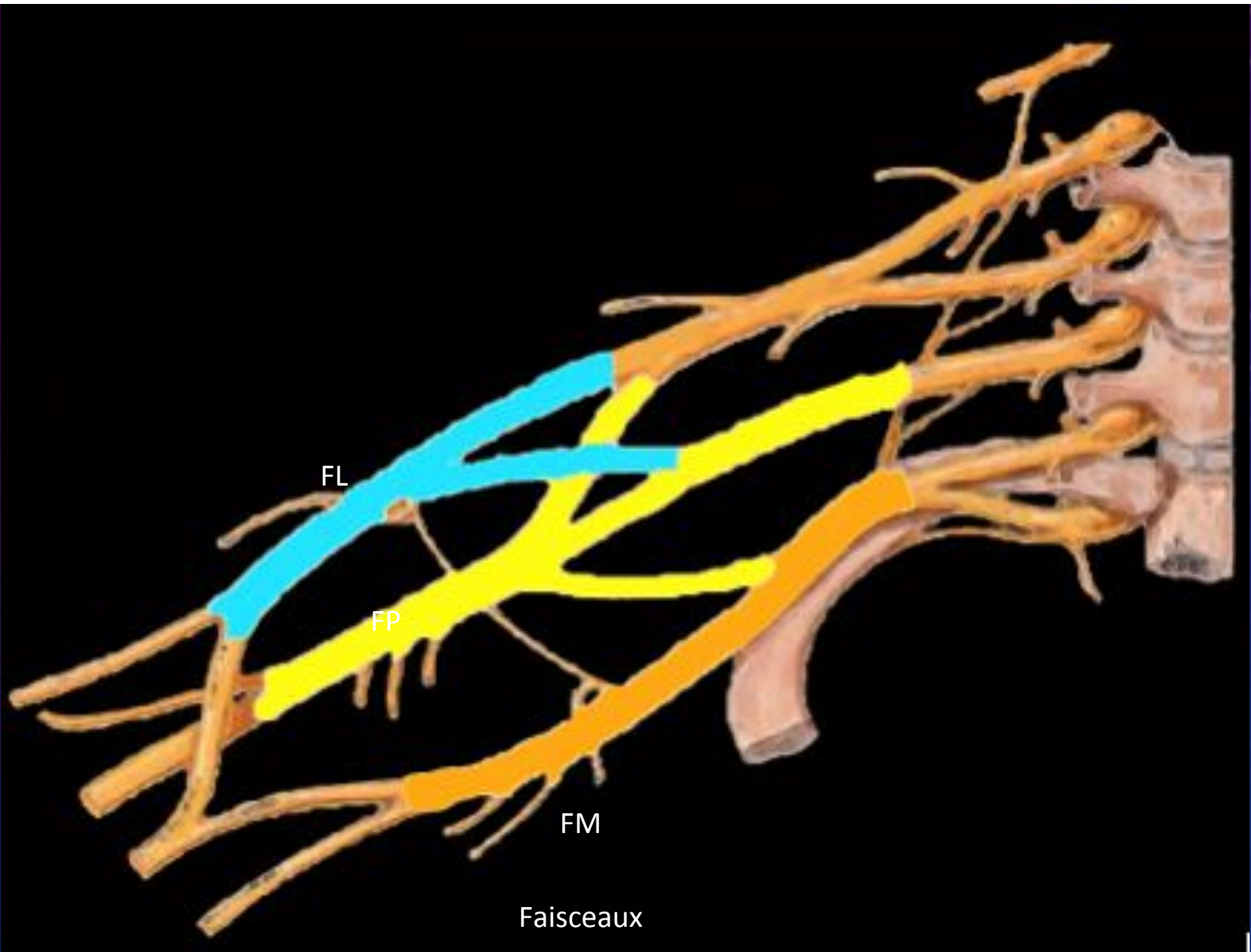
MODEL ANATOMIQUE:



Racines



Troncs



anches terminales

N. Musculo-cutané
5-6-7

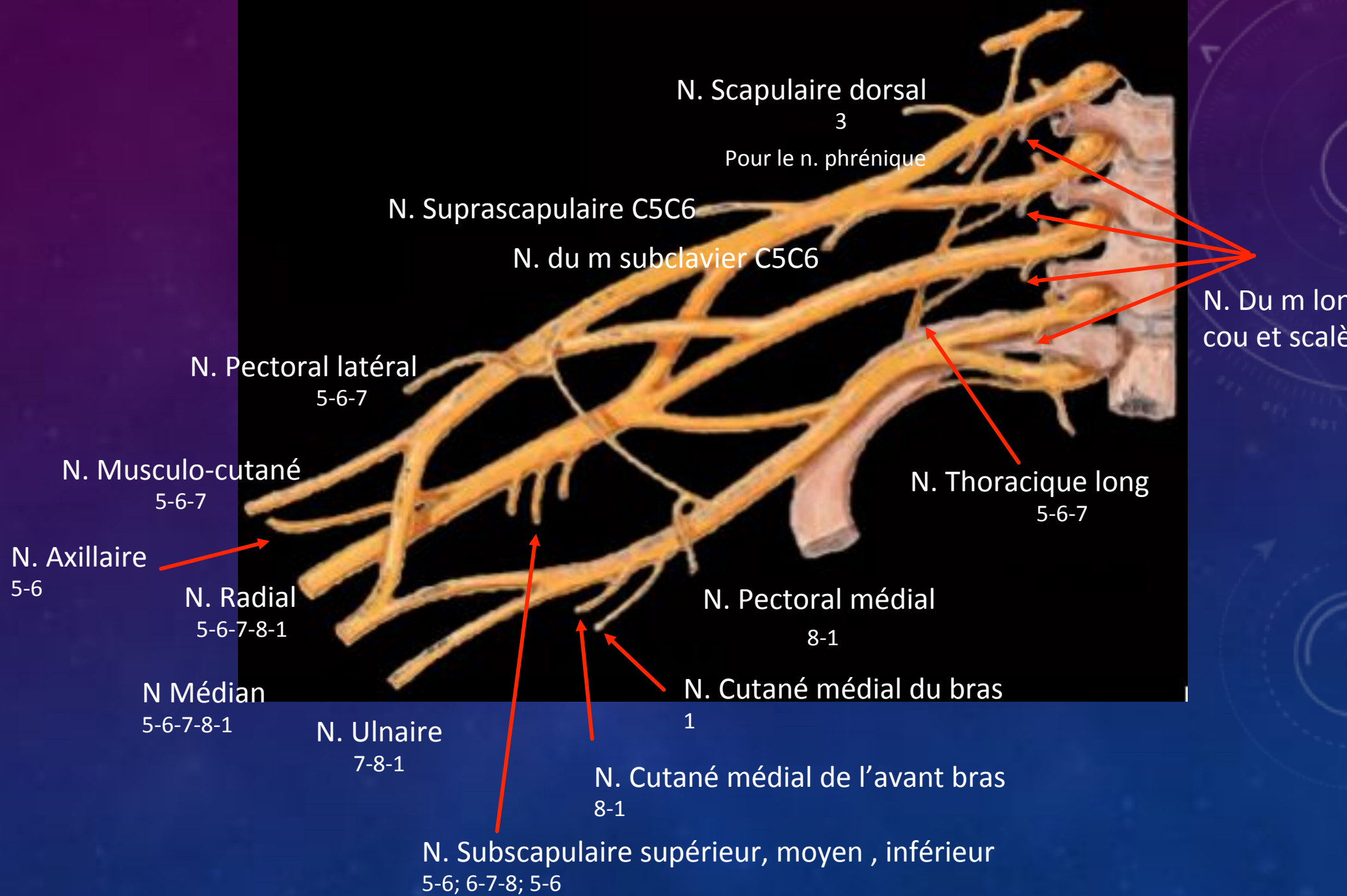
N. Axillaire
5-6

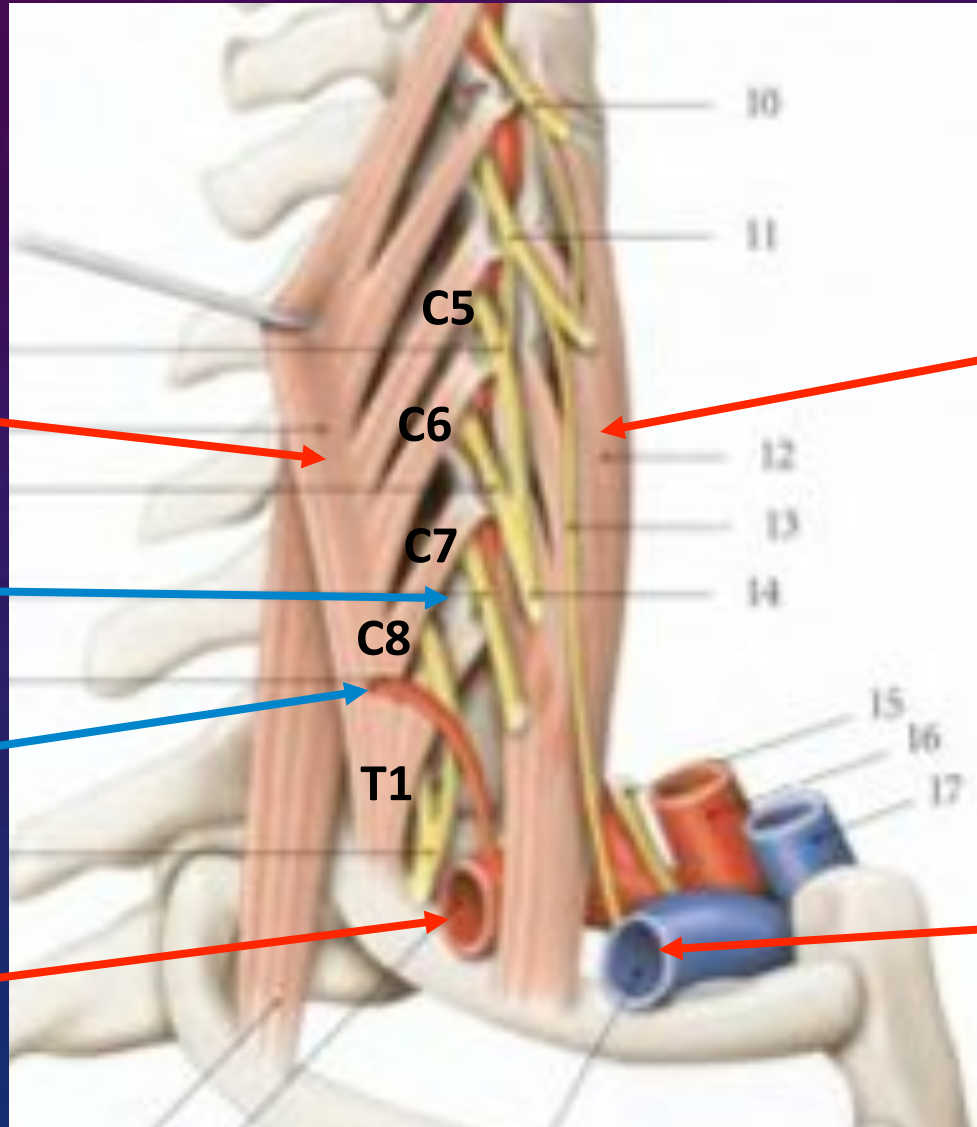
N. Radial
5-6-7-8-1

N Médian
5-6-7-8-1

N. Ulnaire
7-8-1







Scalène Moyen

Scalène Antérieur

P. Transverse de
C7 Non bifide

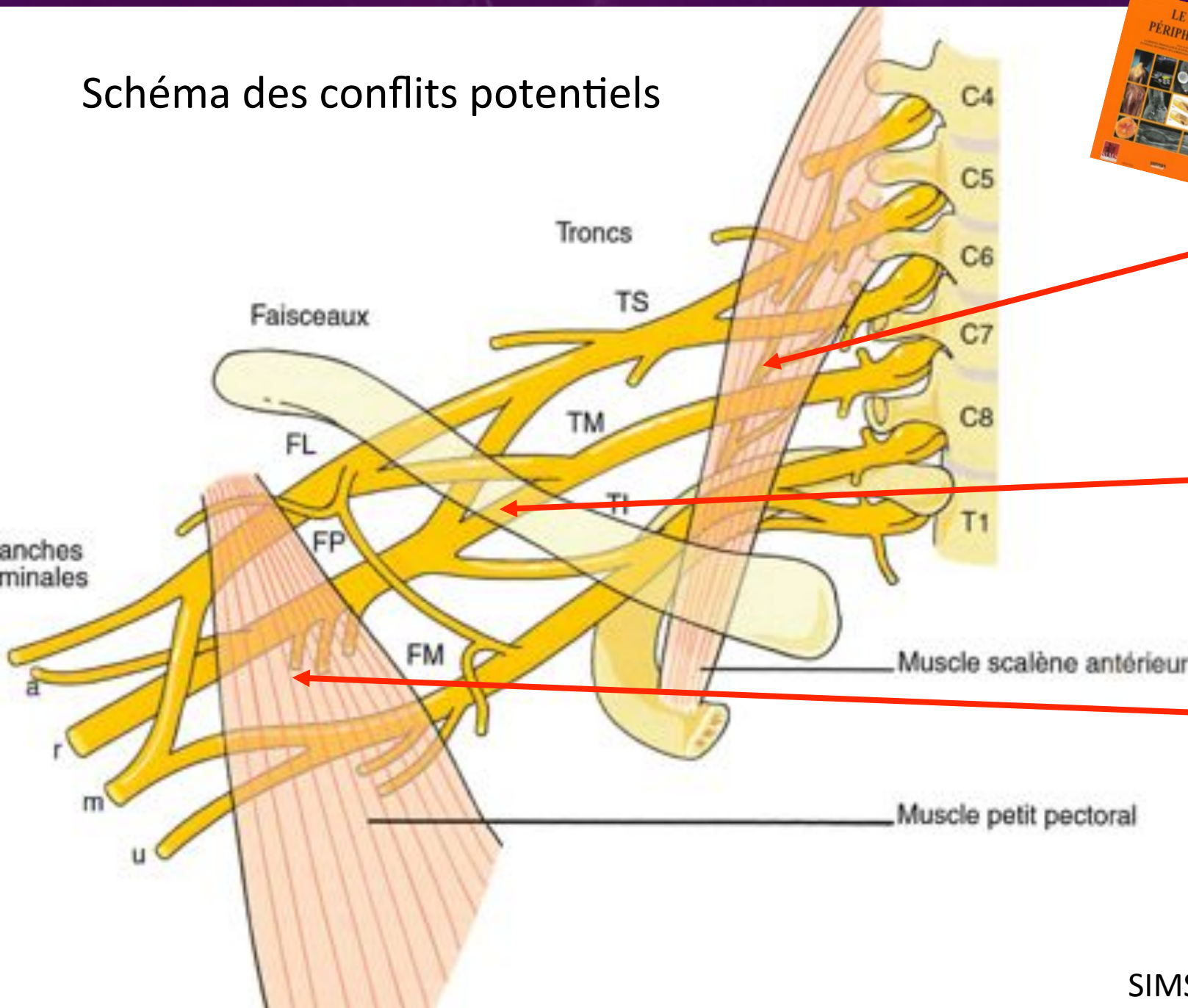
A cervicale (C7-C8)

A. Subclavière

V. Subclavière

Kamina

Schéma des conflits potentiels



Après le défilé interscalénique

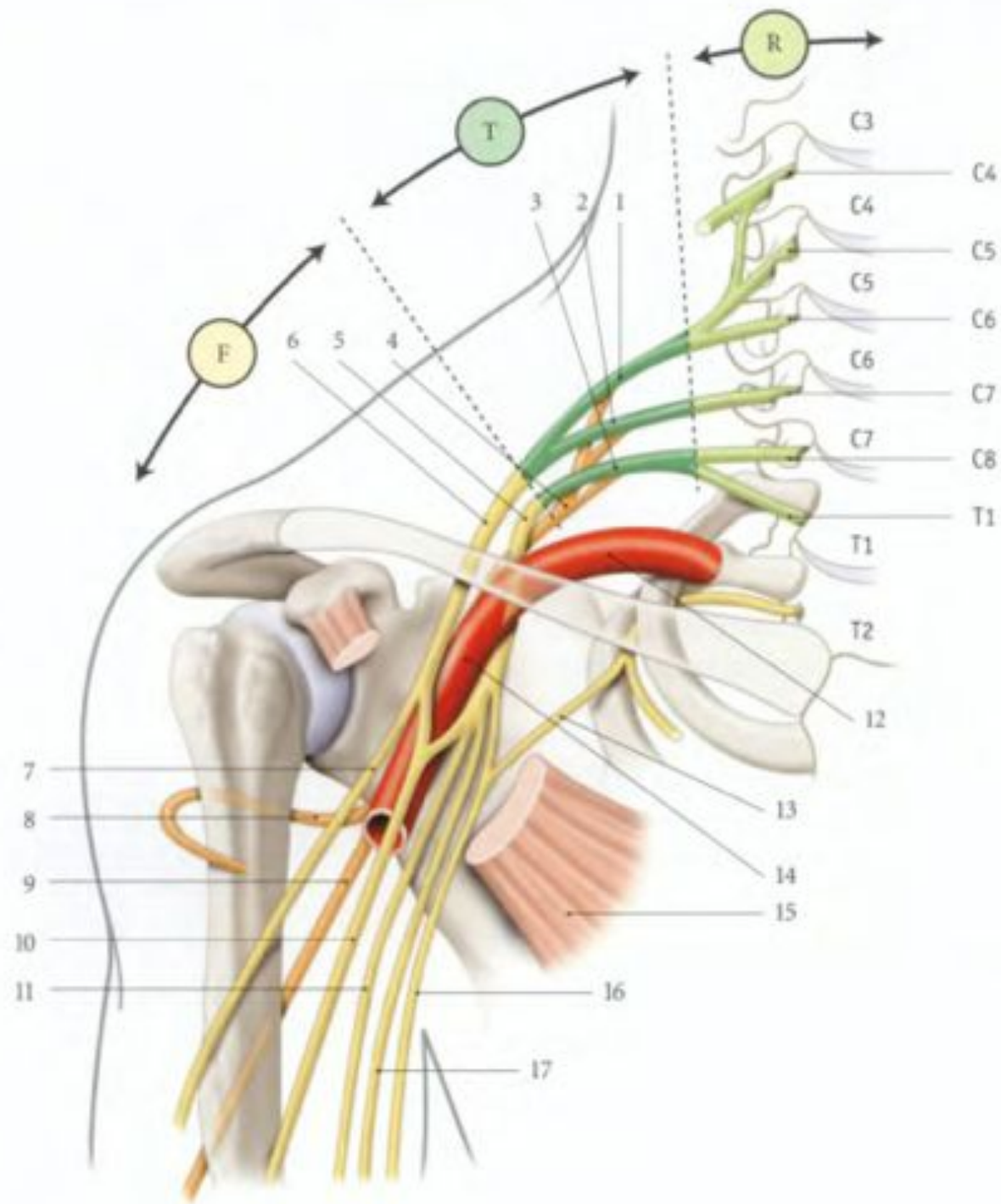
- => troncs

Après la pince costoclaviculaire

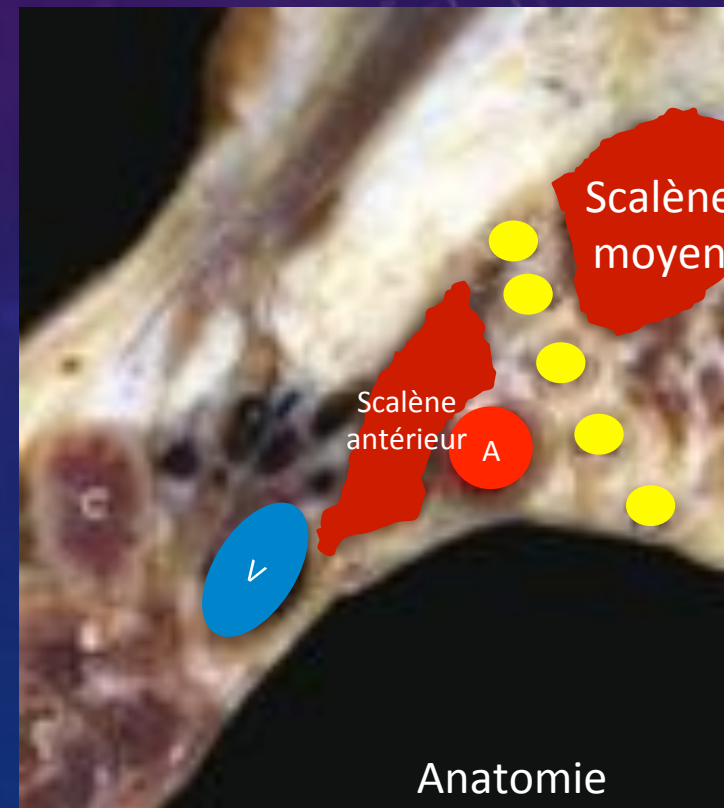
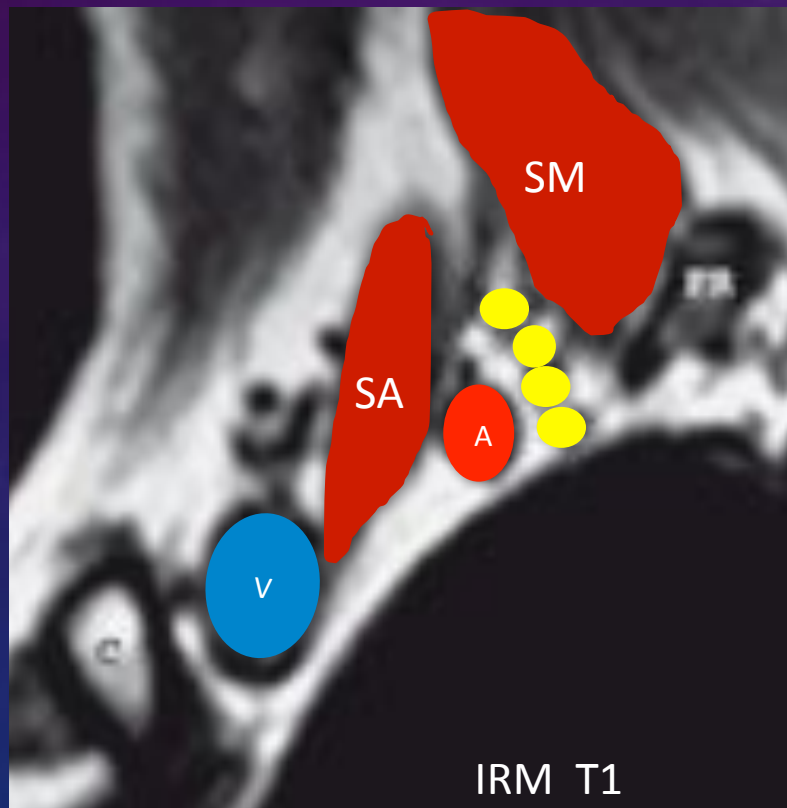
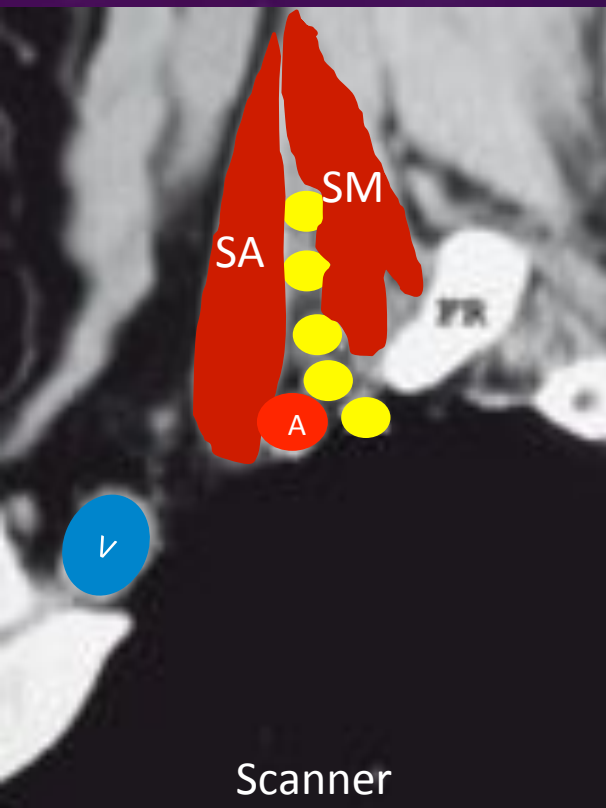
- => Faisceaux

Après le petit pectoral

- => Branches terminales

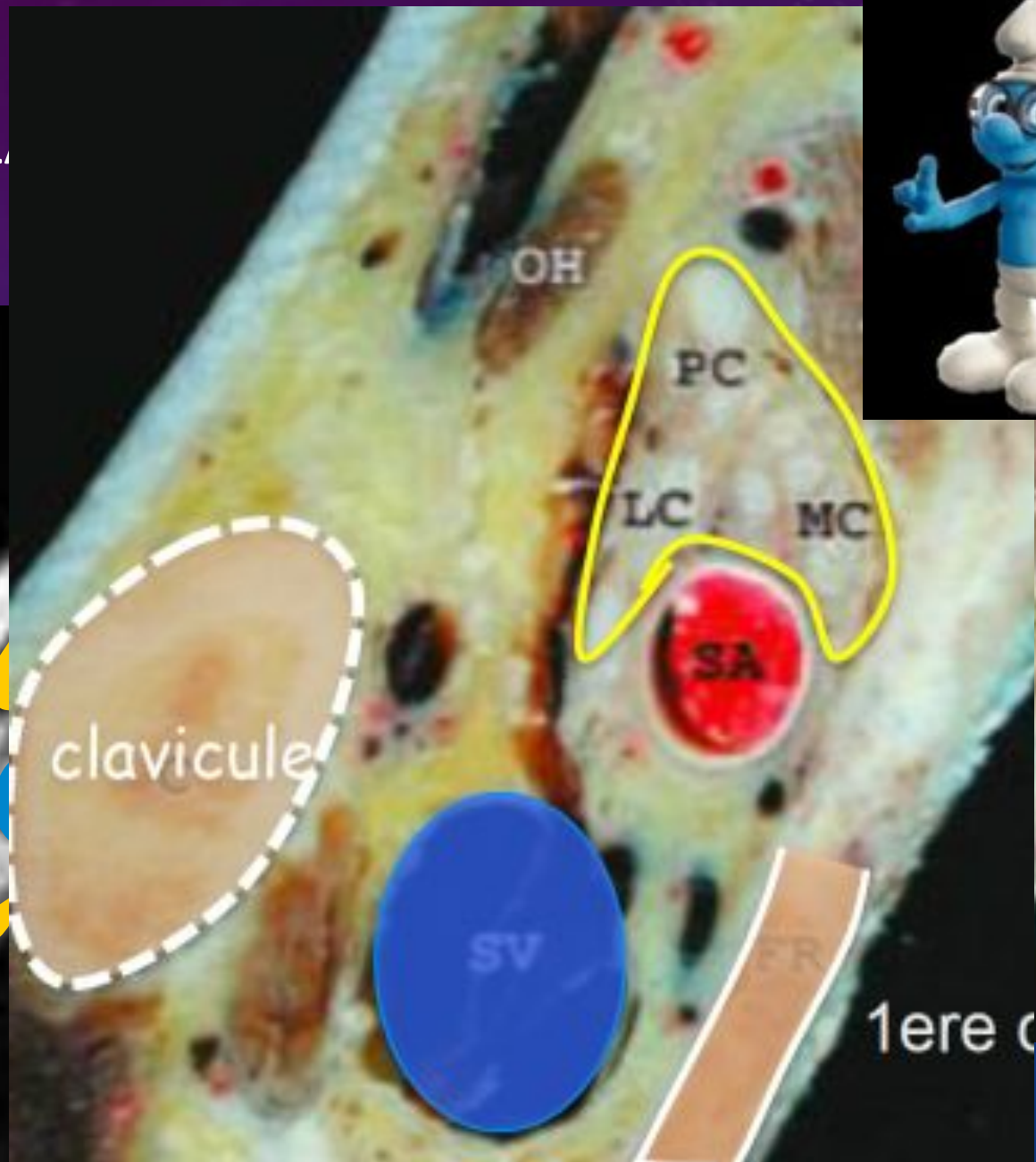


LE DÉFILÉ INTER-SCALÉNIQUE EN SAGITTAL



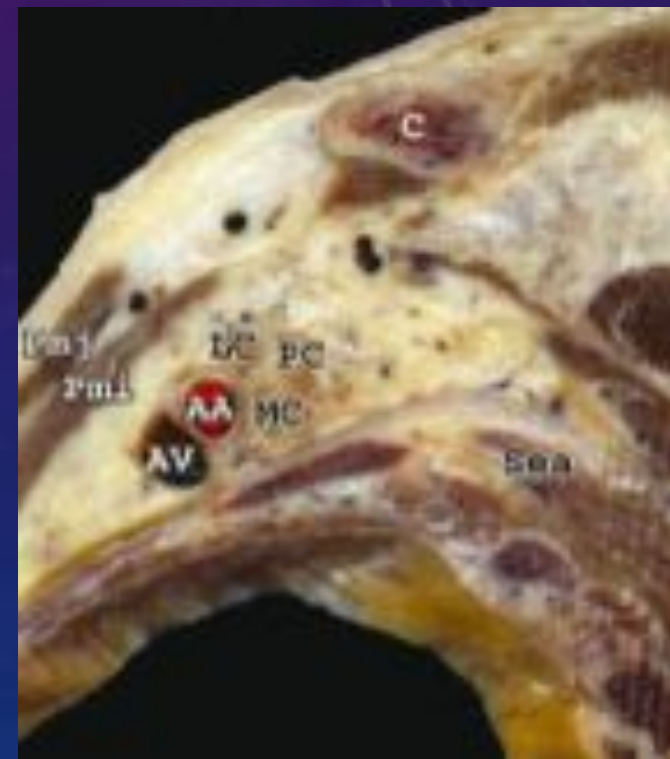
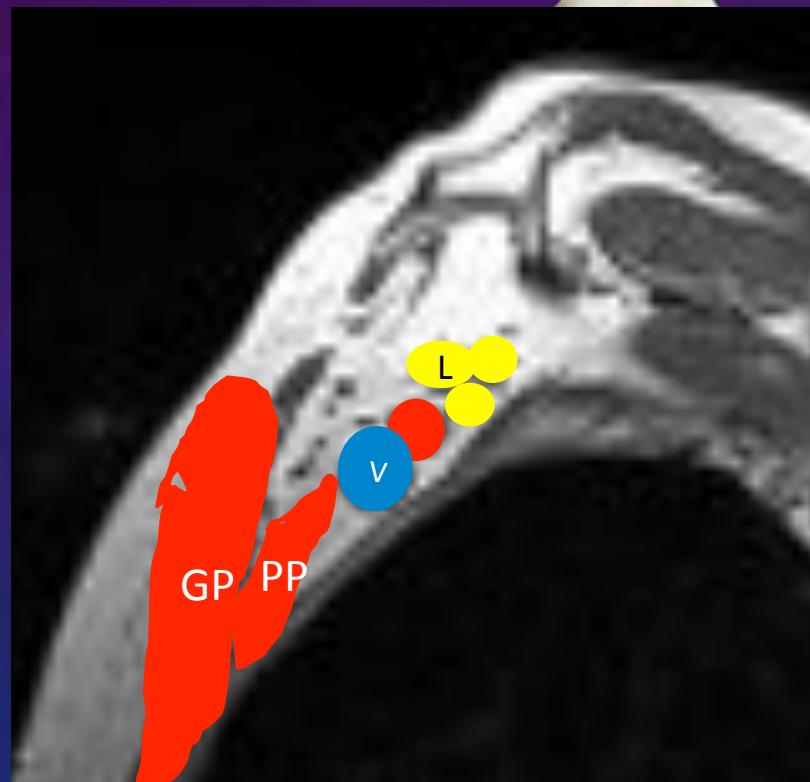
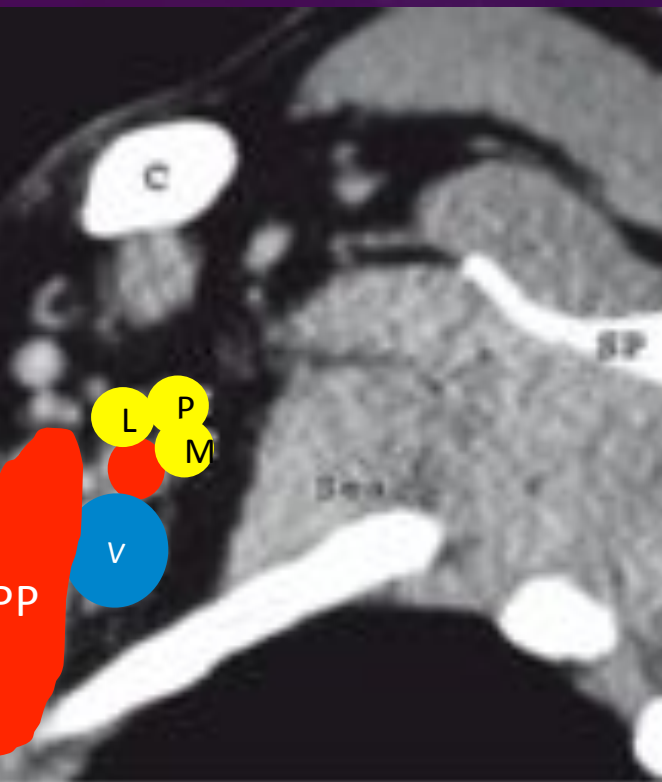


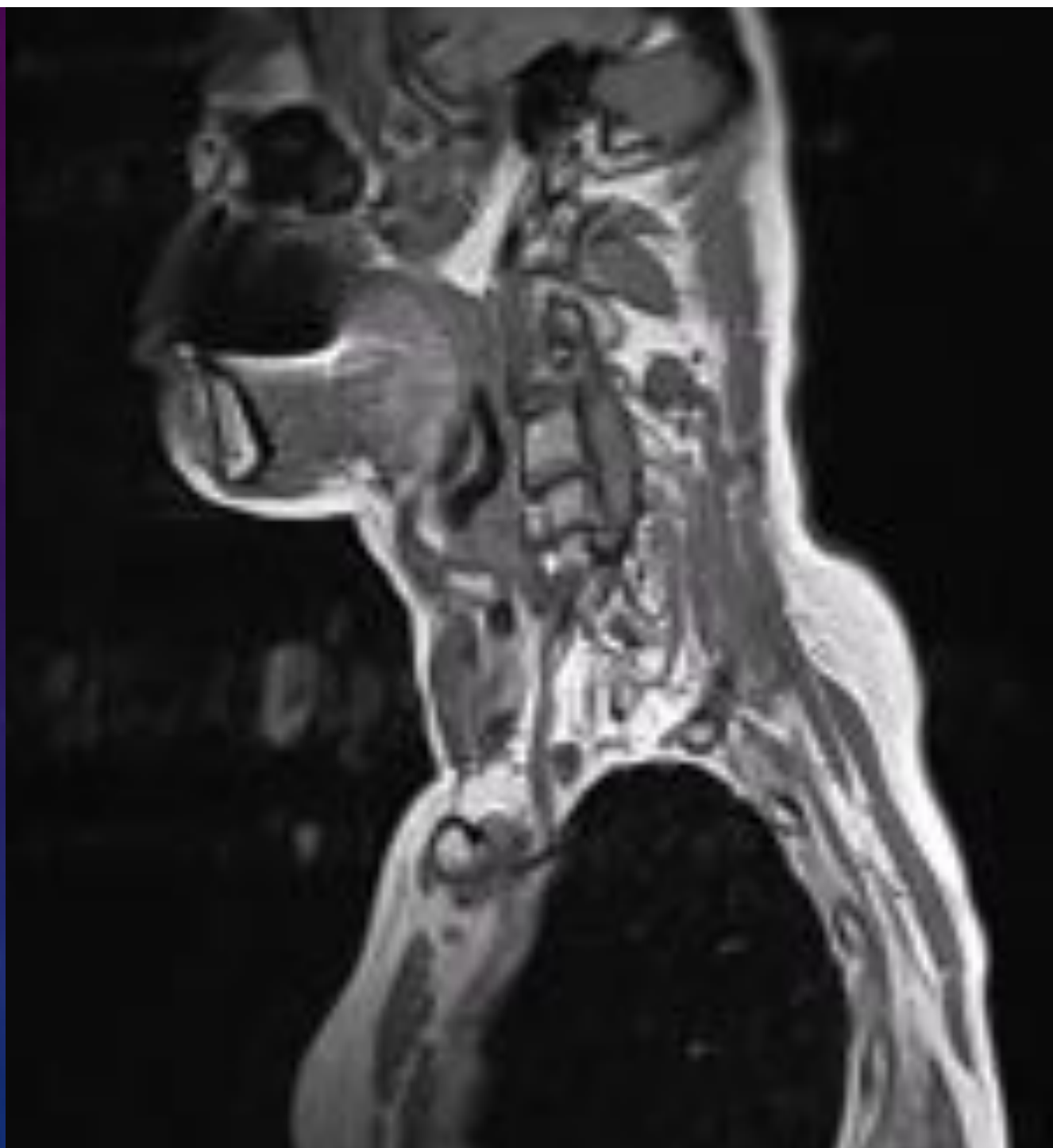
L



1ere c

TUNNEL DU PETIT PECTORAL





TECHNIQUES D'EXPLORATIONS

- Radiographies: (débrouillage)
 - Pancoast Tobias
 - Lésion osseuse
 - Anomalie constitutionnelle (cote surnuméraire...)
- Echographies:

HOGRAPHIE

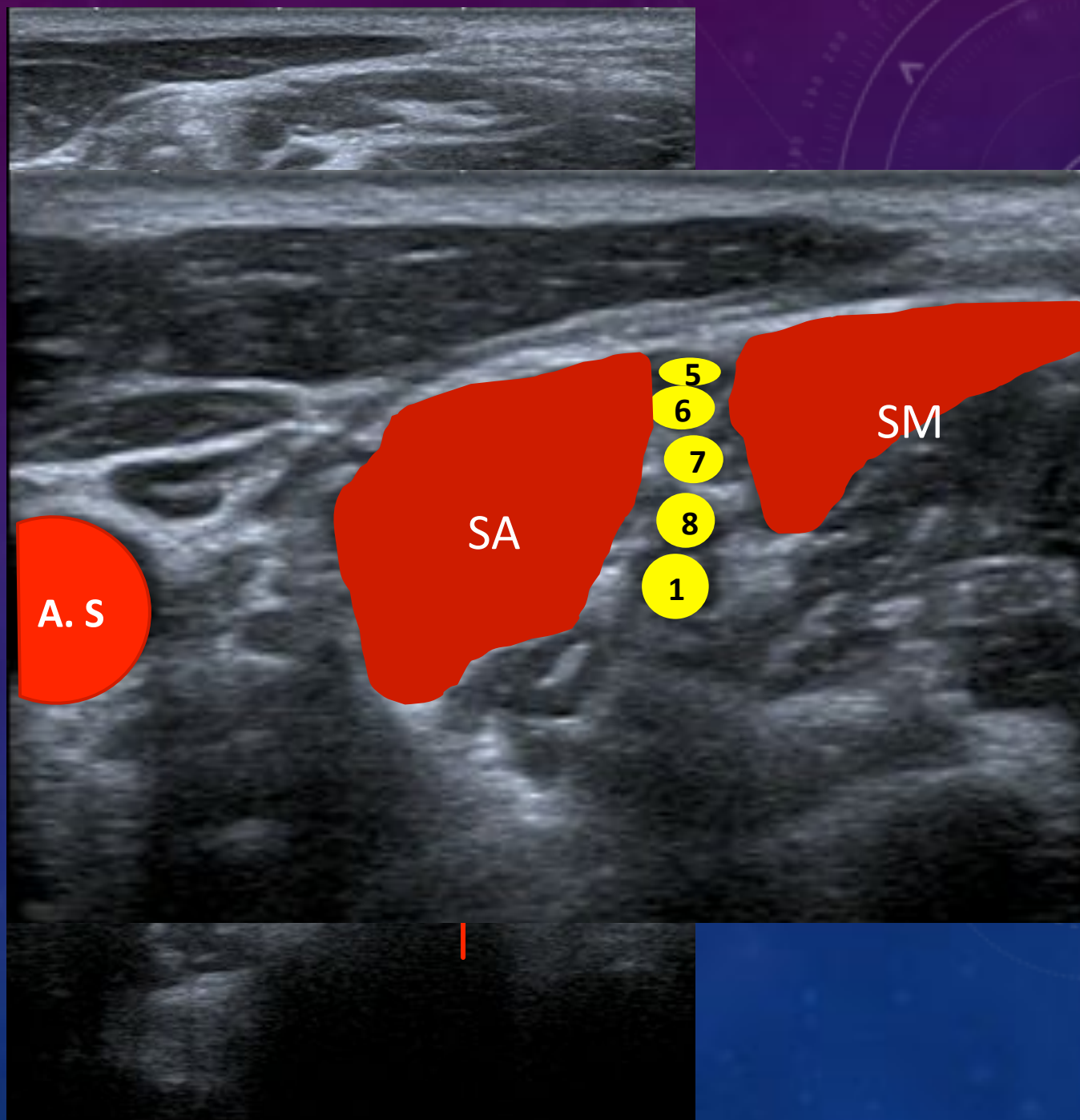
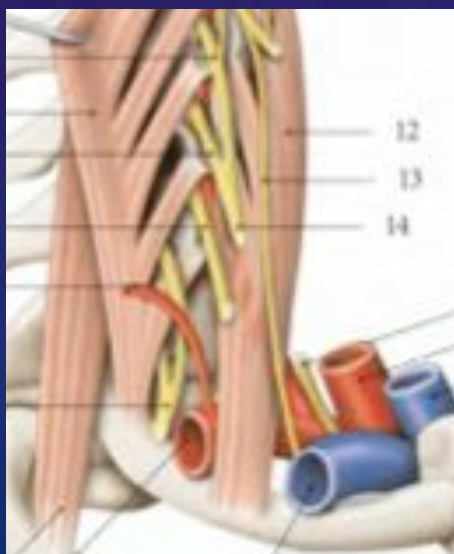
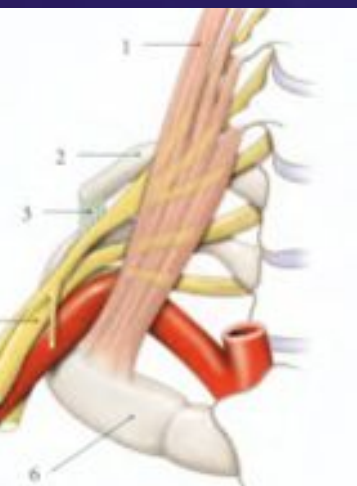
Sonde haute fréquence 10 à 18Mhz

Échostructure du plexus brachial est différente des nerfs périphériques.

Excellente résolution spatiale.

Structures tubulées hypo échogènes, non fasciculées.

- Région paravertébrale
 - Repère
 - apophyse transverse de C7
 - A cervicale entre C7 et C8
- Région interscalénique
 - A sousclavière est en avant de C8-T1



HOGRAPHIE

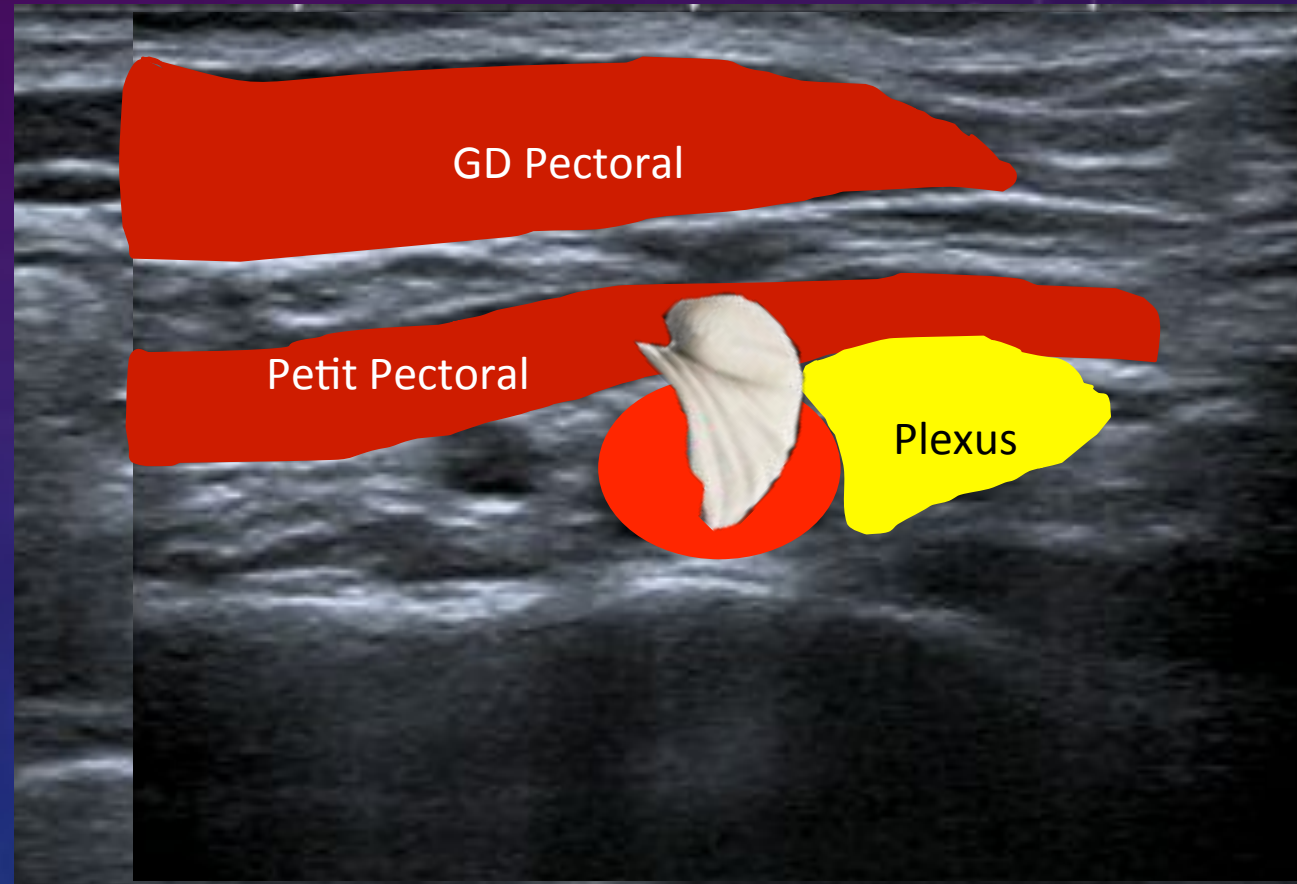
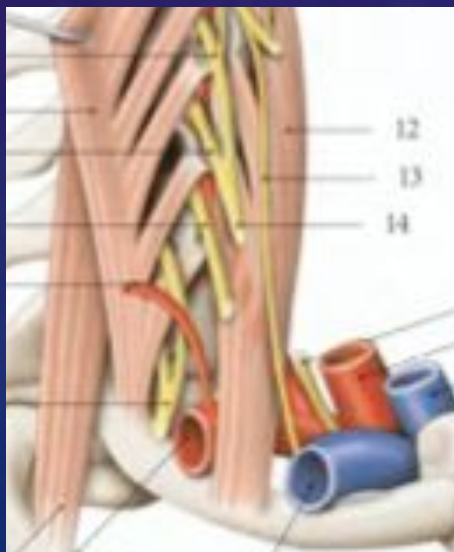
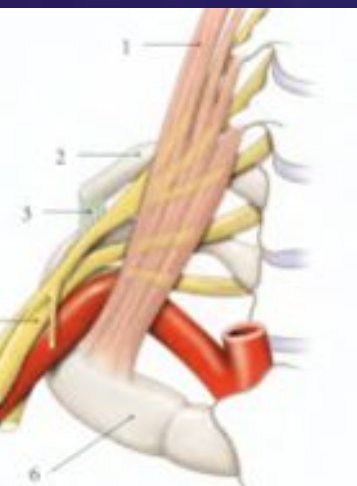
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- Région interscalénique
 - A sousclavière est en avant de C8-T1
- Région périclavulaire
- Région rétropectorale



ANNER

- Faible résolution en contraste, peu performant pour l'analyse du plexus brachial.
- Permet de rechercher des anomalies autour
- Rôle clé pour
 - l'exploration du syndrome du défilé cervico-thoracique
 - associé aux manœuvres dynamiques
 - Bras surélevé et rotation controlatérale du cou
 - Le myélo-scanner, peut être utilisé dans le bilan des lésions traumatiques, en cas de CI à l'IRM
 - Analyse osseuse

- Rôle majeur dans la survenue d'un déficit sensitivo-moteur après une irradiation en permettant de différencier une atteinte post-radique d'une récurrence tumorale

- Gold
- Très bon contraste entre les différents tissus
- Plein de possibilités
-
- Pour l'anatomie : Sag et Coro T1 non FS
- STIR très sensible pour la détection des lésions.

Tableau 2 : Protocole pour l'exploration IRM du plexus brachial en fonction du contexte clinique

Contexte clinique	Protocole IRM
Lésion traumatique du plexus brachial	<i>Rachis cervical</i> Sagittal T1 Sagittal T2 Séquence myélographique ← <i>Plexus</i> Sagittal T1 3D T2STIR axial et sagittal T1 FAT SAT gadolinium
Lésion tumorale	Sagittal T1 ← 3D T2STIR Axial et Sagittal T1 FAT SAT gadolinium Tractographie ←
Syndrome du défilé cervico-brachial	<i>Bras le long du corps</i> Sagittal T1 ← 3D T2STIR <i>Bras en abduction</i> ← Sagittal T1 3D T2STIR Séquence angiographique ←
Pathologie inflammatoire	Sagittal T1 3D T2STIR Axial et Sagittal T1 FAT SAT gadolinium Coro STIR et T1

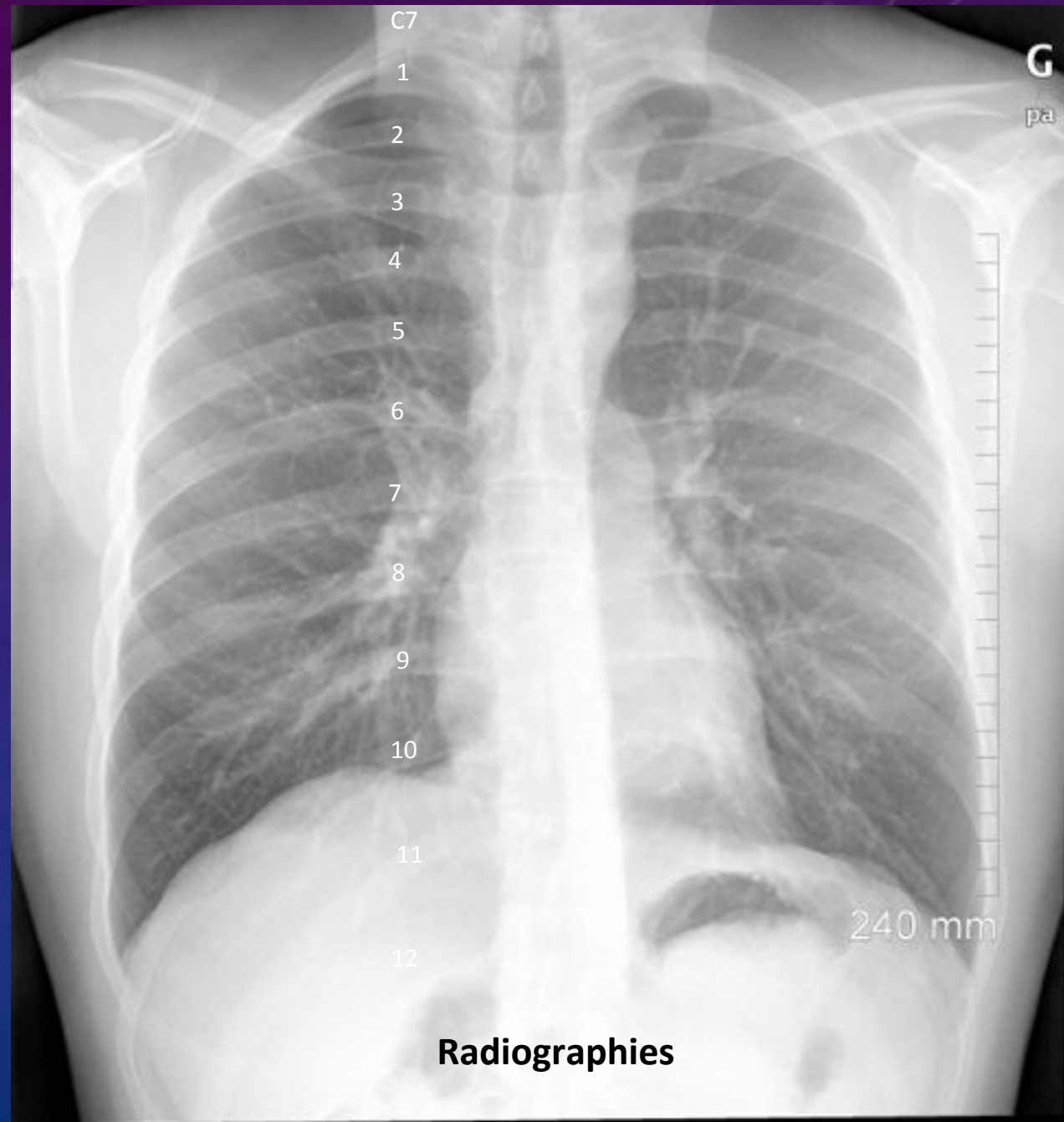


PATHOLOGIE

- I Le syndrome du défilé cervico-brachial
- II traumatismes du plexus brachial
- III Tumeur (intrinsèque et extrinsèque)
- IV Tumeur/ Fibrose
- V Neuropathies inflammatoires

SD DU DÉFILÉ

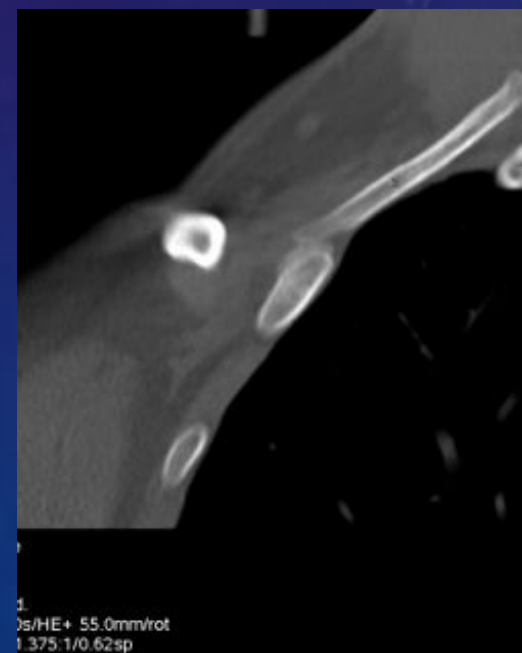
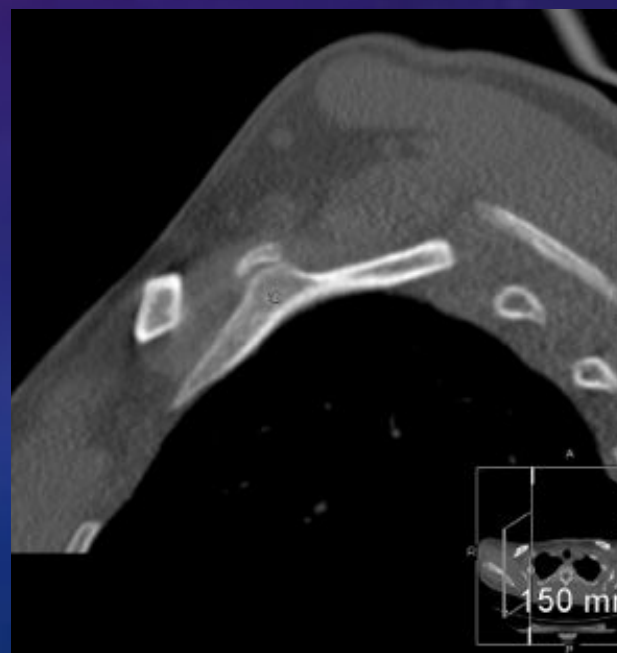
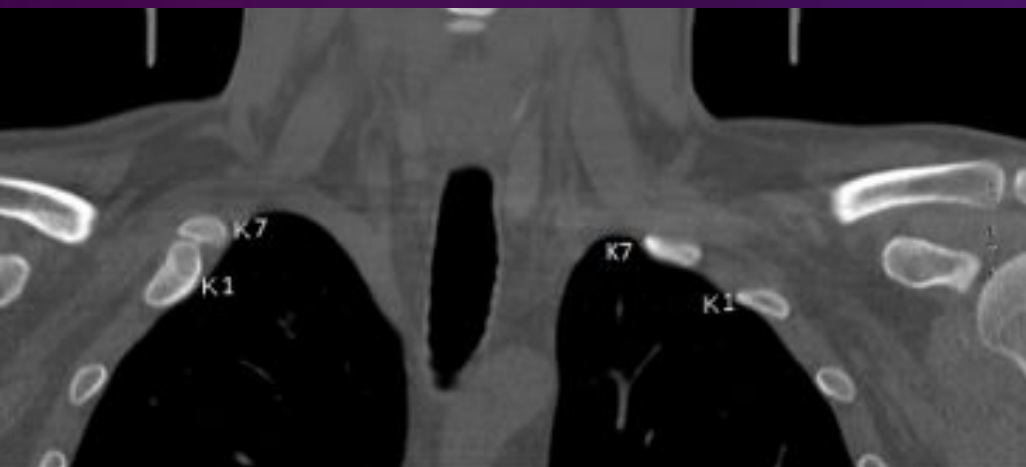
me 29 ans déficit brutal du mb sup D au réveil
nte C5-C6-C7 à l'EMG



Radiographies

SD DU DÉFILÉ

CT du plexus brachial



Syndrome du défilé cervico-brachial sur une synostose K7-K1

LE SYNDROME DU DÉFILÉ CERVICO-BRACHIAL :

Etiologies

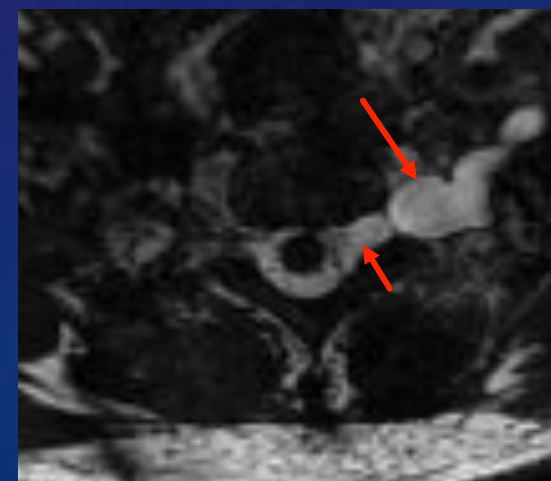
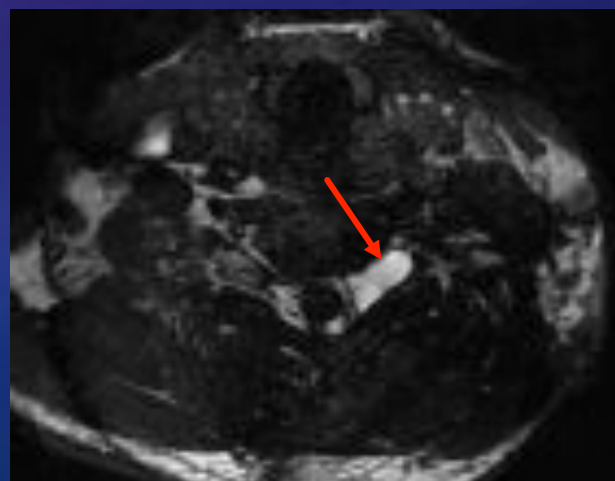
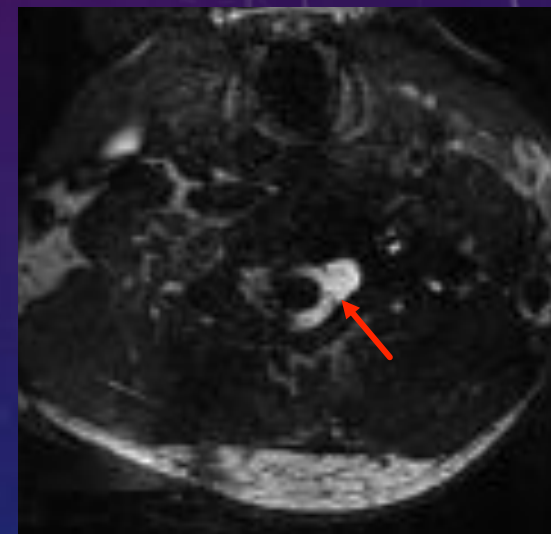
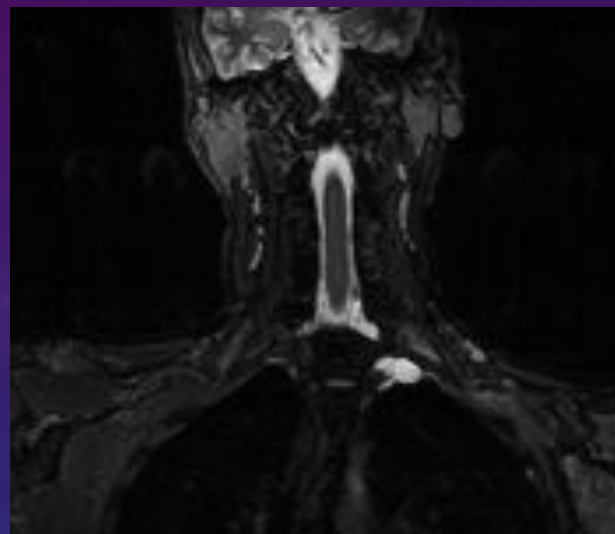
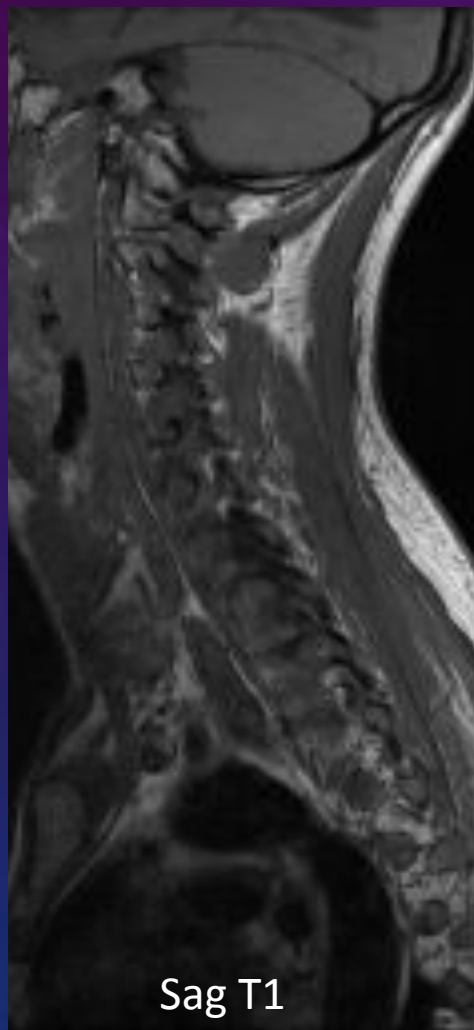
- Etroitesse constitutionnelle de la «pince» (femme mince, peu musclée, épaules en avant);
- Côte cervicale (Rx, scanner)
- Processus transverse de C7 long (scanner)
- Anomalies de la 1^{ère} côte ou de la clavicule
- Bandelettes congénitales (-> 1^{ère} côte, IRM+)
- Anomalie des scalènes
- Tumeurs

LES TRAUMATISMES DU PLEXUS BRACHIAL:

Déficit du mb sup gauche suite à AVP moto

me 30 ans AVP moto et déficit du mb sup gauche

Séquences ciss – fiesta – drive coro ou sag 3D



IRM cervicale et du plexus brachial

LES TRAUMATISMES DU PLEXUS BRACHIAL:

Déficit du mb sup gauche suite à AVP moto

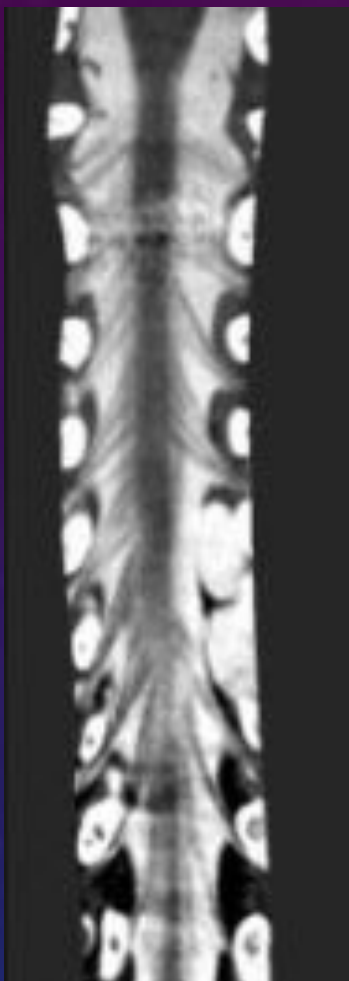
Myélo-scanner même patient



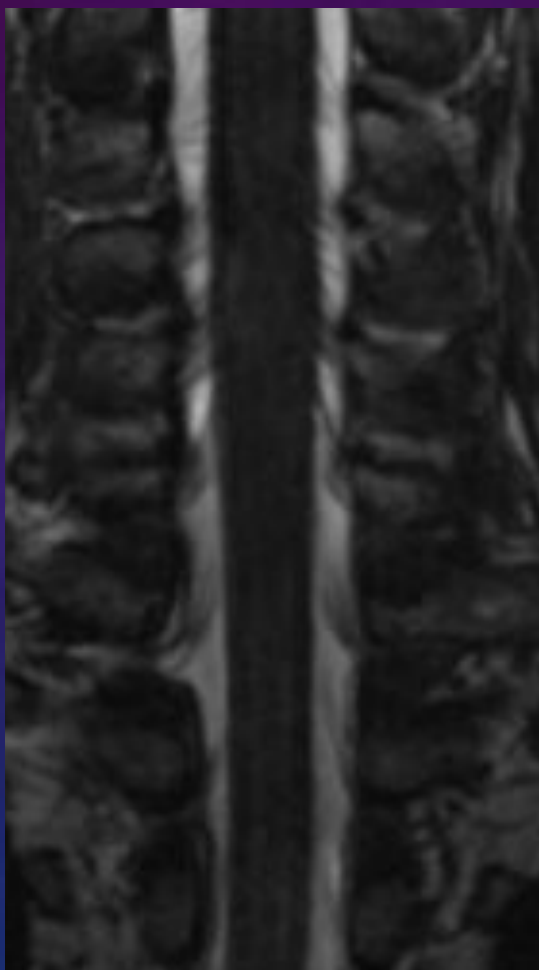
Lésion pré-ganglionnaire C8-T1

LES TRAUMATISMES DU PLEXUS BRACHIAL:

Déficit du mb sup gauche suite à AVP moto



(myéloscanner)



Séquences MR myélographiques (EG)



Coupes anatomiques

LES TRAUMATISMES DU PLEXUS BRACHIAL:

Déficit du mb sup gauche suite à AVP moto

- Imagerie difficile (champ étendu, petites racines)
- IRM doit inclure cordon médullaire + muscles épaules
- Différencier:
 - Lésion pré-ganglionnaire (pas de réparation possible, transfert N)
 - Lésion post-ganglionnaire (autogreffe de nerf, suture)
- L'IRM peut être normale même en cas d'atteinte prouvée par ENMG (1/3 série de Vargas J neuroradiologie 2000 atteintes distales)

B) TUMEUR INTRINSÈQUE

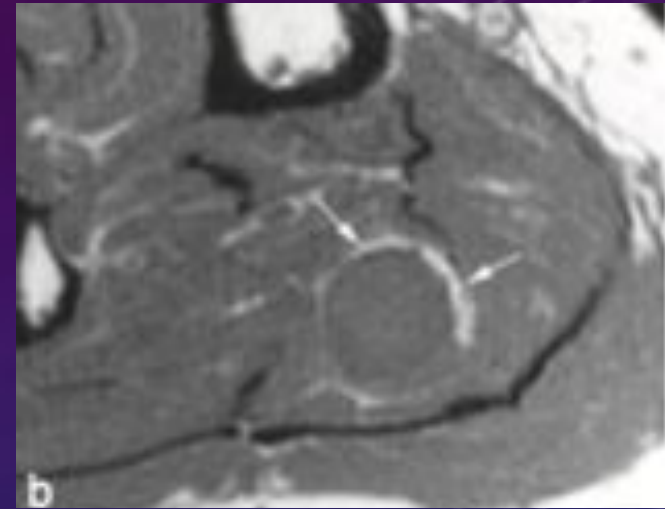
Tumeurs neurogènes du plexus brachial

Neuro-fibrome (50-60%)

Neurofibromatose de type I (1/3 des cas)

Sporadique (2/3 des cas)

Centré sur le nerf, homogène, plus souvent multiples

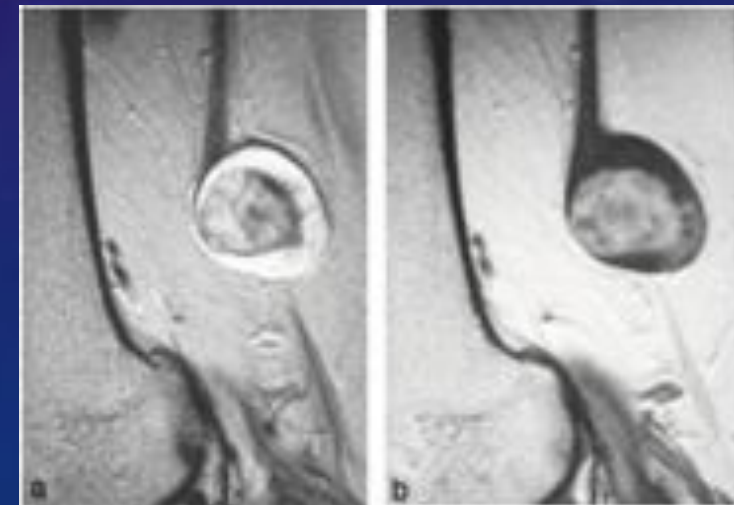


Signe de la couronne grasseuse (*split fat sign*) : refoulement de la graisse qui entoure le nerf

Schwannome (20%)

Solitaire

Volontiers excentré, de contours réguliers



PNST (malignant peripheral nerve sheath tumors 14%)

Terrain = neurofibromatose ou radiothérapie

Signe de la cible :

zone fibrocellulaire centrale: T2 bas et réhaussement cent

zone myxoïde périphérique : T2 élevé.

B) TUMEUR INTRINSÈQUE

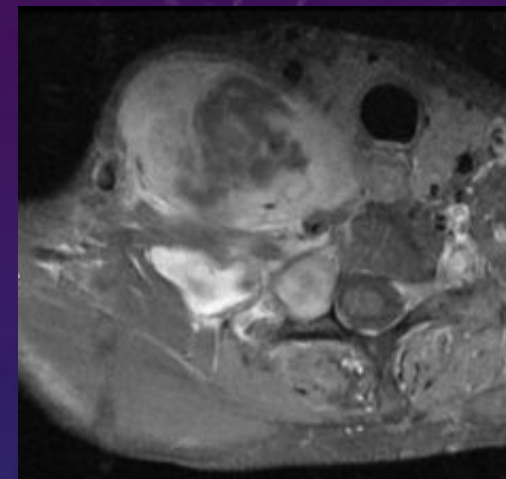
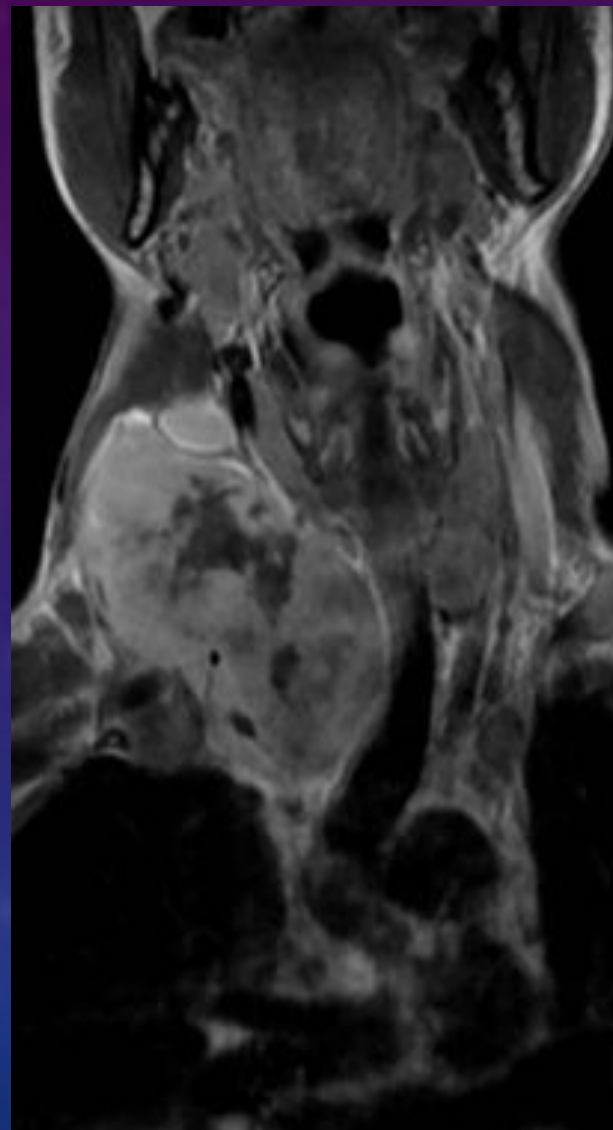
- Patient de 28 ans, NF1
- Apparition d'une masse cervicale

MPNST (malignant peripheral nerve sheath tumors 14%)

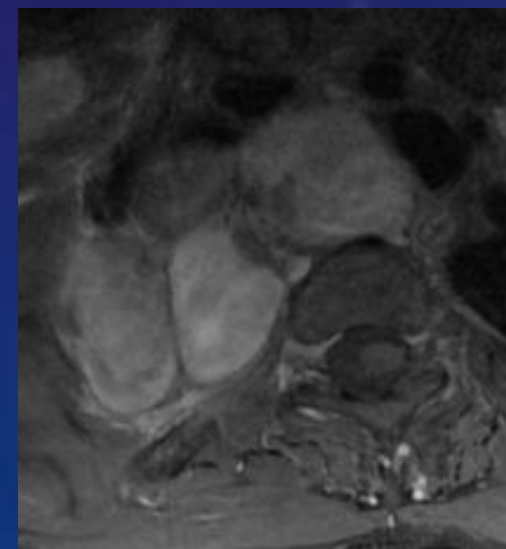
- Terrain = neurofibromatose ou radiothérapie
 - Taille ≥ 5 cm,
 - réhaussement périphérique,
 - zones oedémateuses périlésionnelles,
 - zones kystiques intra-tumorales

Probabilité élevée de malignité si au moins 2 critères
(**spécificité 90 %, sensibilité 61%**)

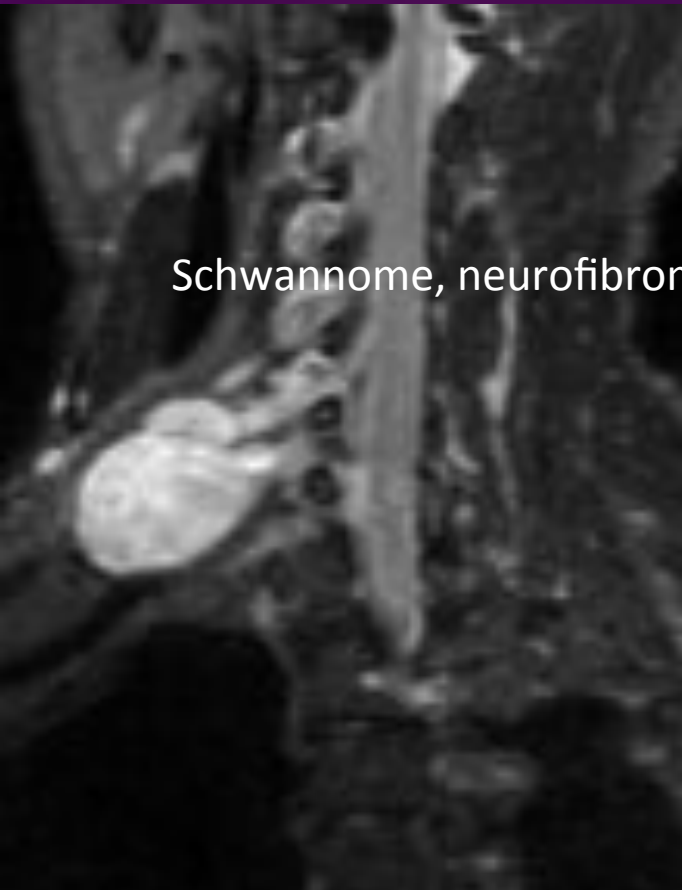
Pour les patients porteurs d'une NF1: hétérogénéité
en T1 également en faveur d'une lésion maligne



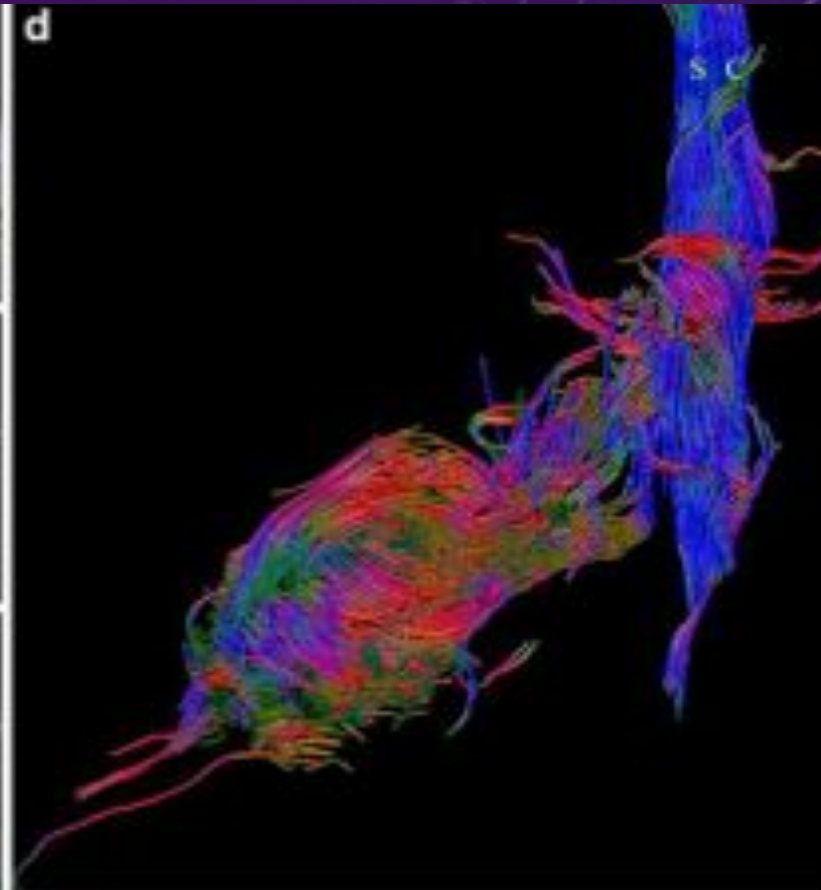
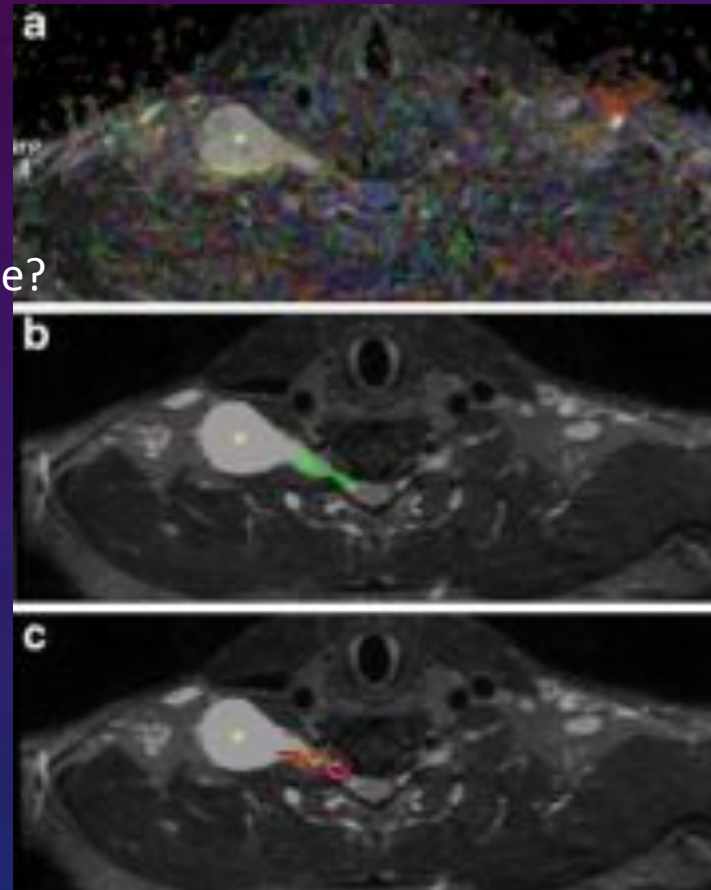
Anapath: MPNST



NEUROFIBROMA



Schwannome, neurofibrome?

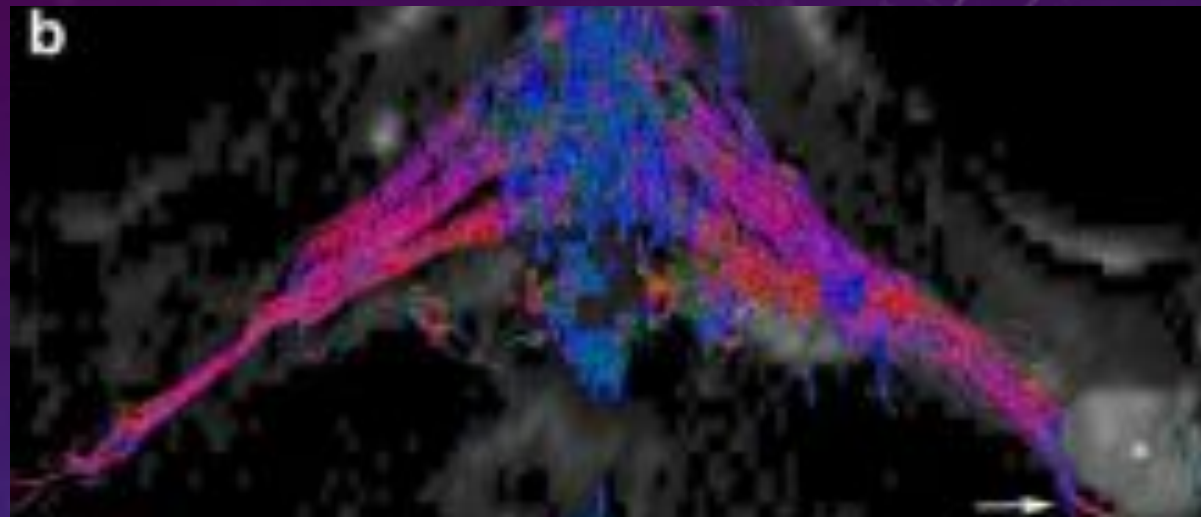


SCHWANNOME

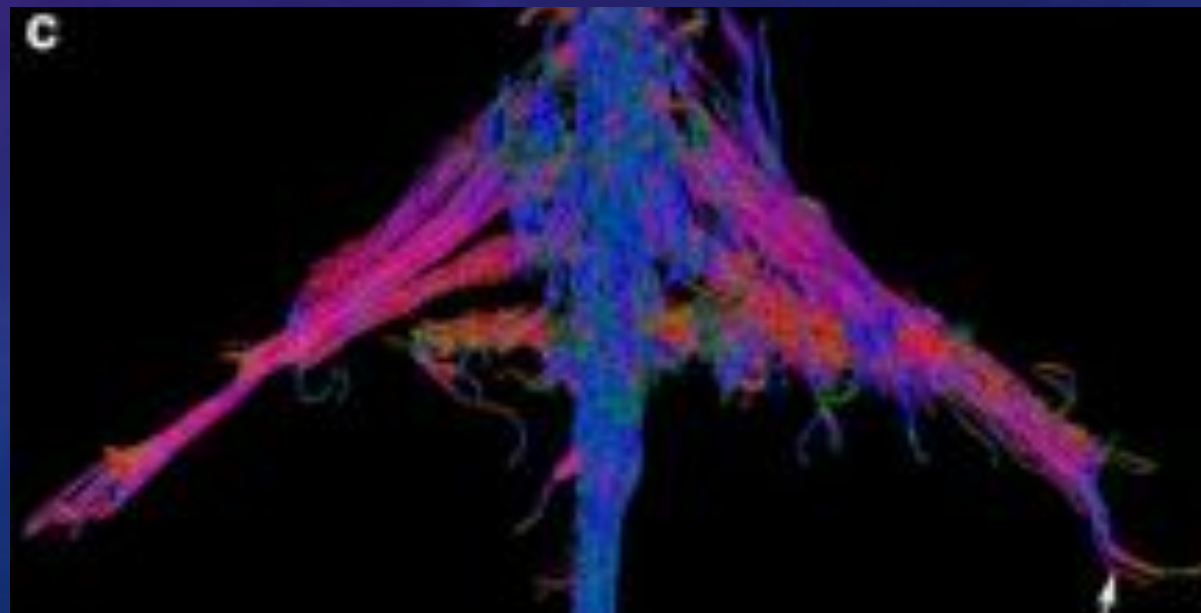


* et * Schwannomes

Seul le deuxième * montre clairement la position périphériques des fibres



Nerf refoulé, lésion excentrée par rapport au nerf, pas de fibre nerveuse au centre



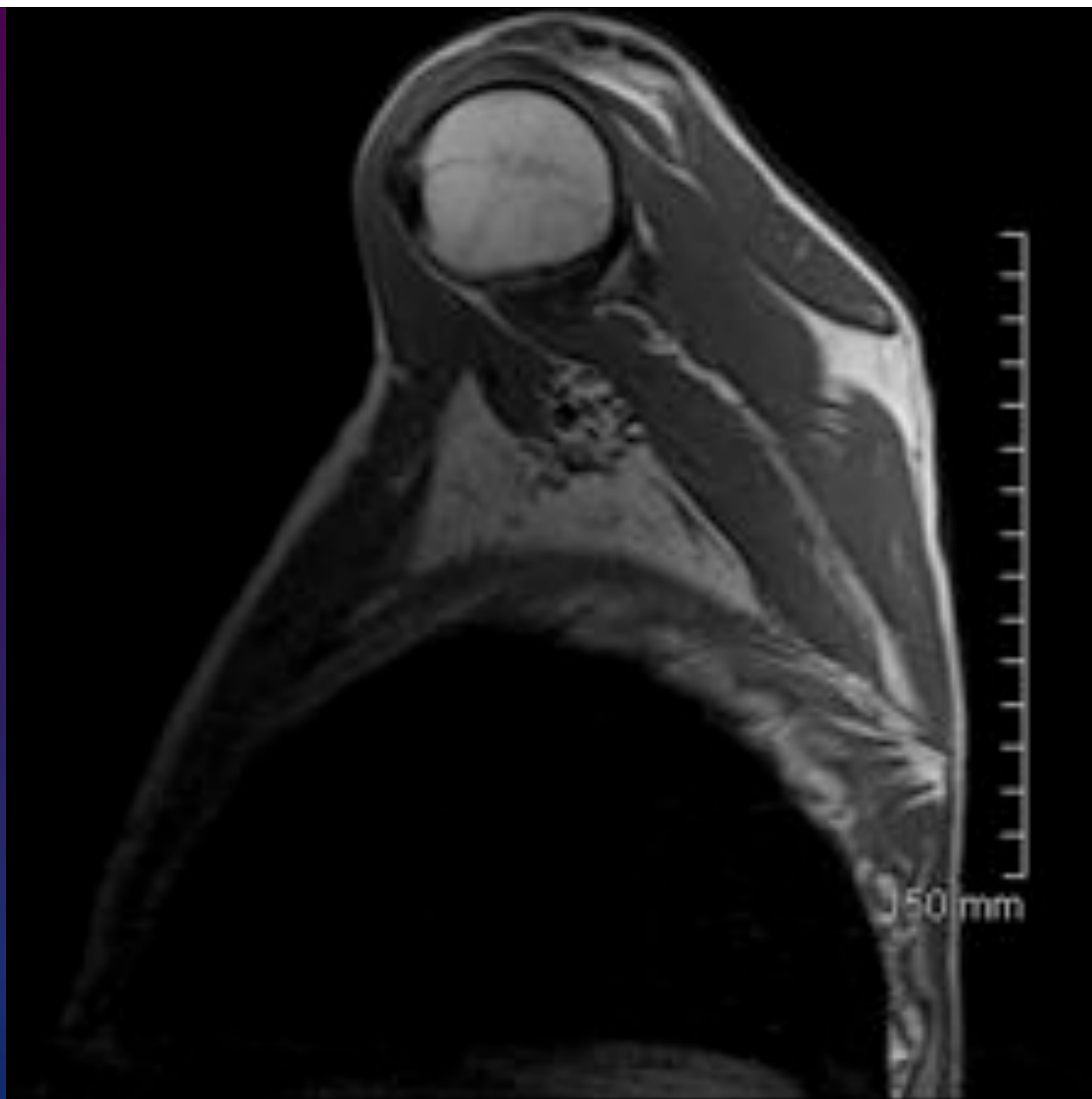
B) TUMEUR EXTRINSÈQUE

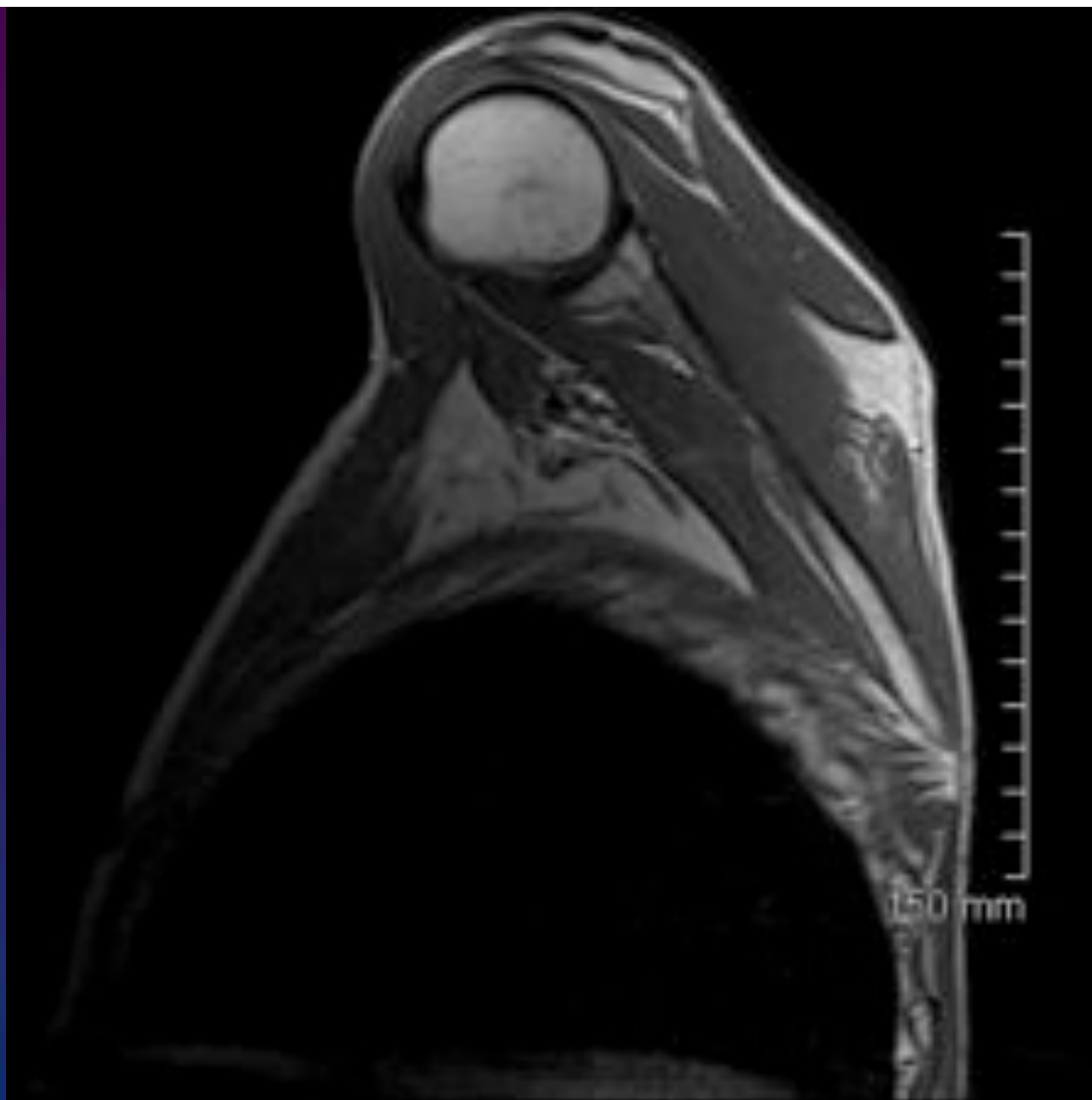
Cancer du poumon recherche d'une atteinte du plexus

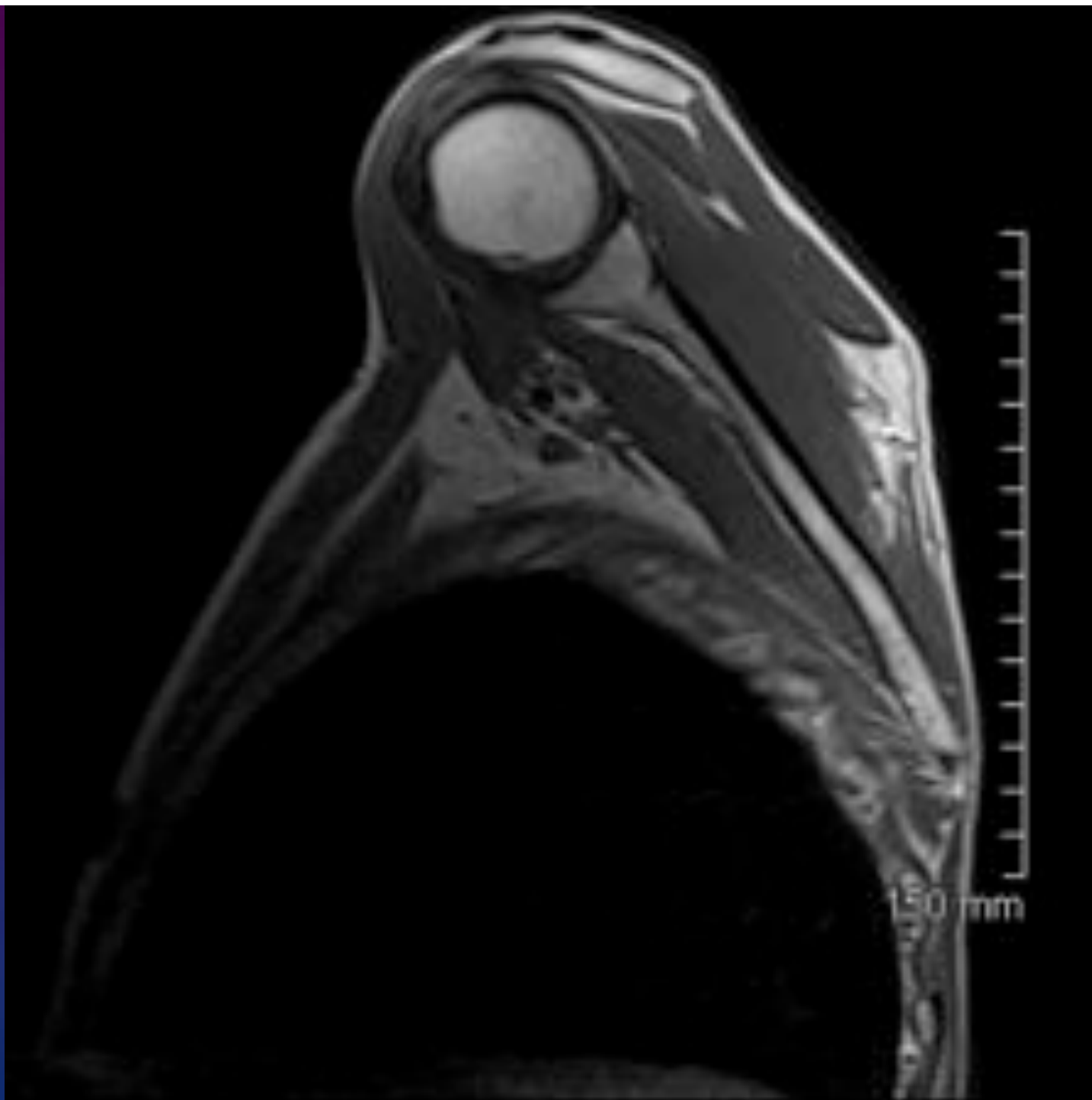
IRM du plexus brachial

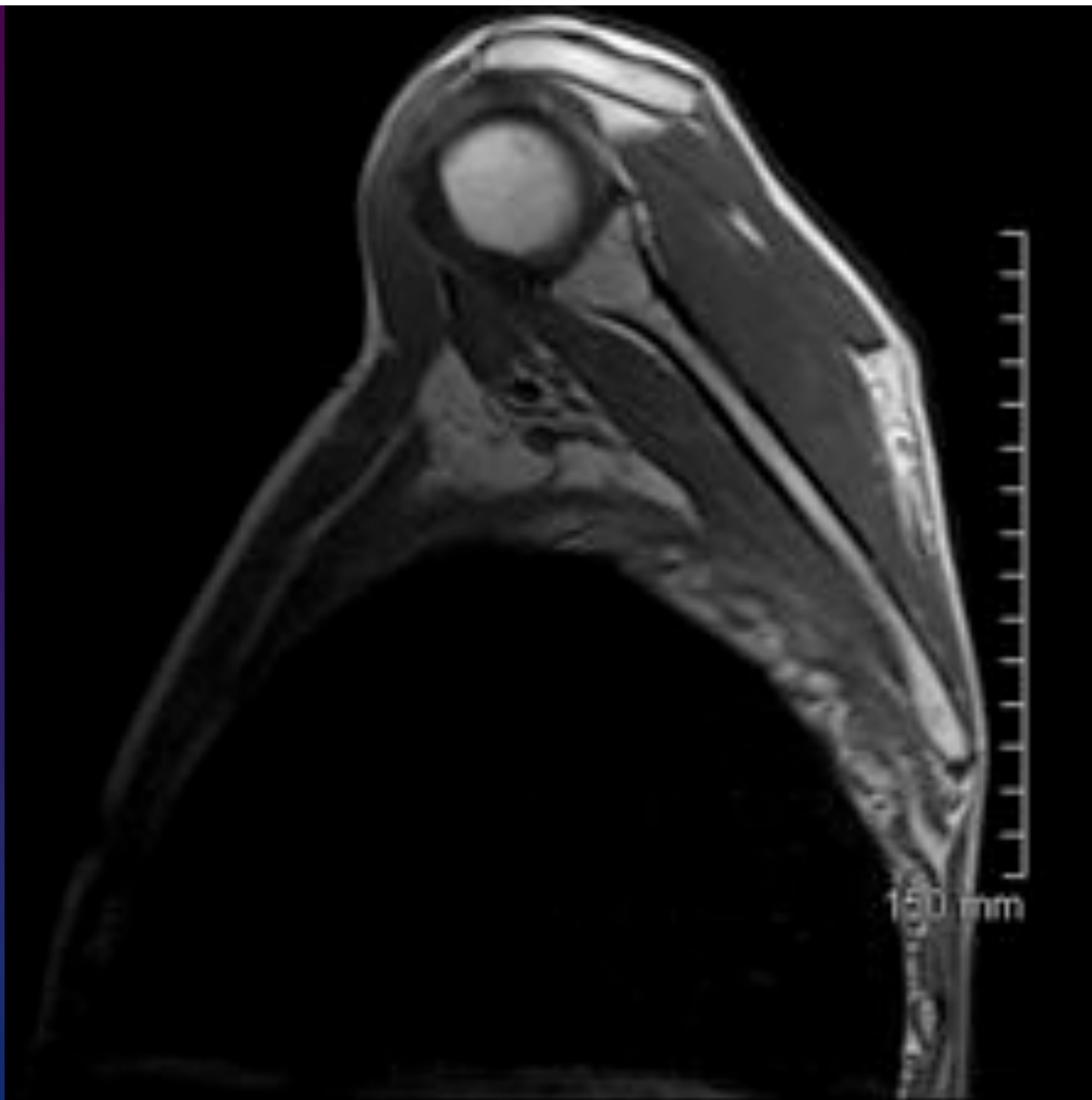
Sequence Sag T1 de Plexus
FAT SAT

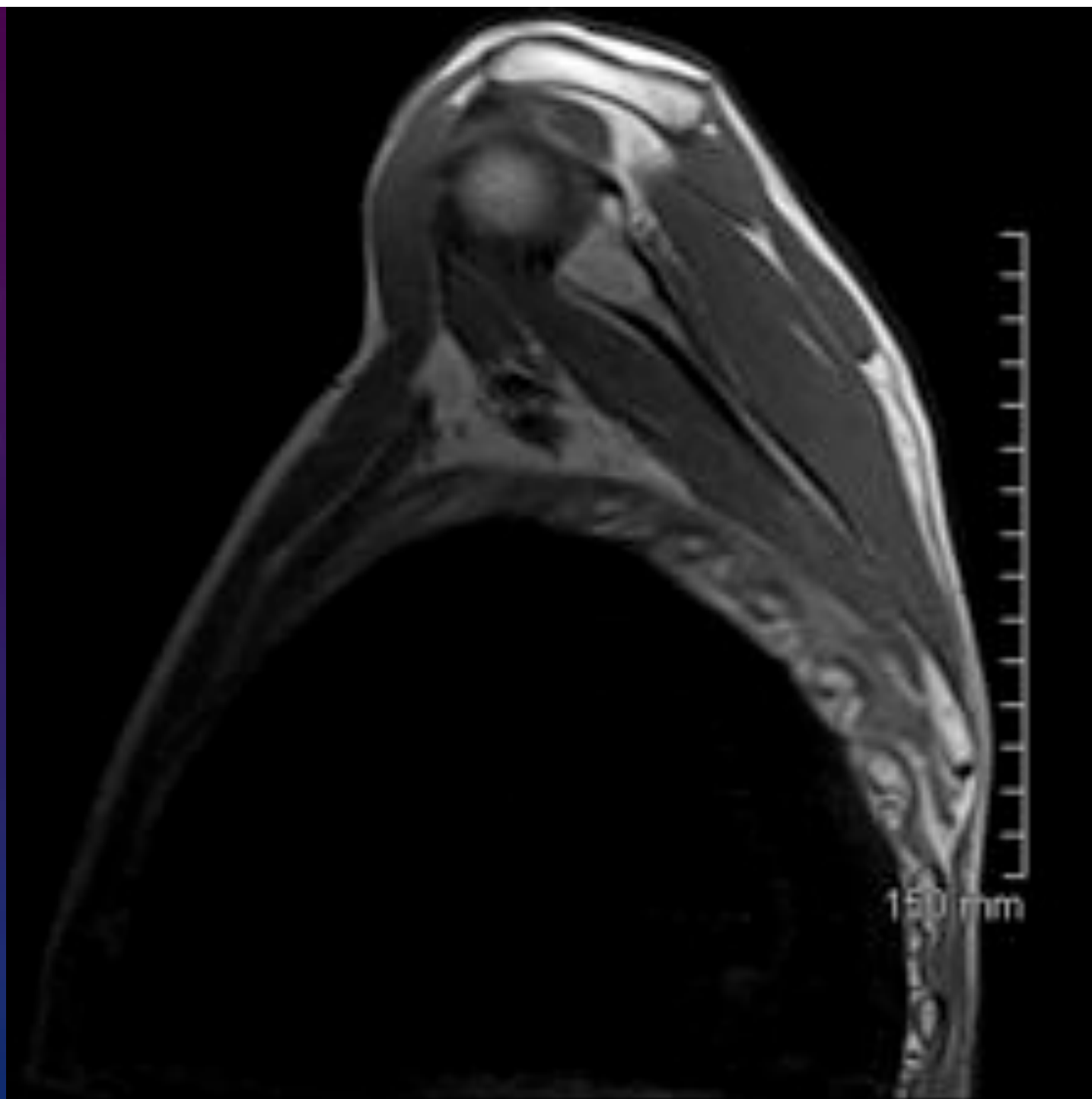


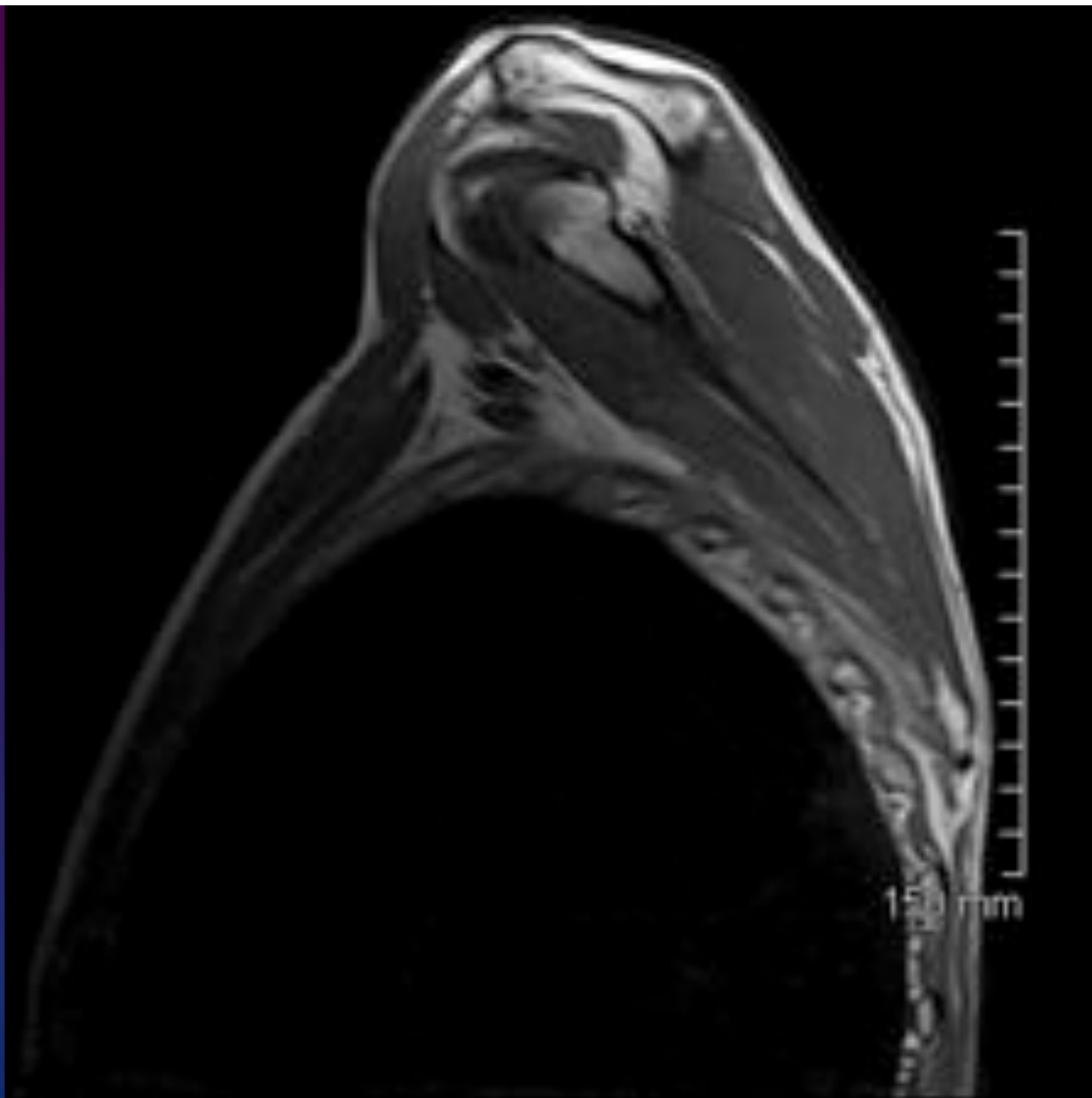


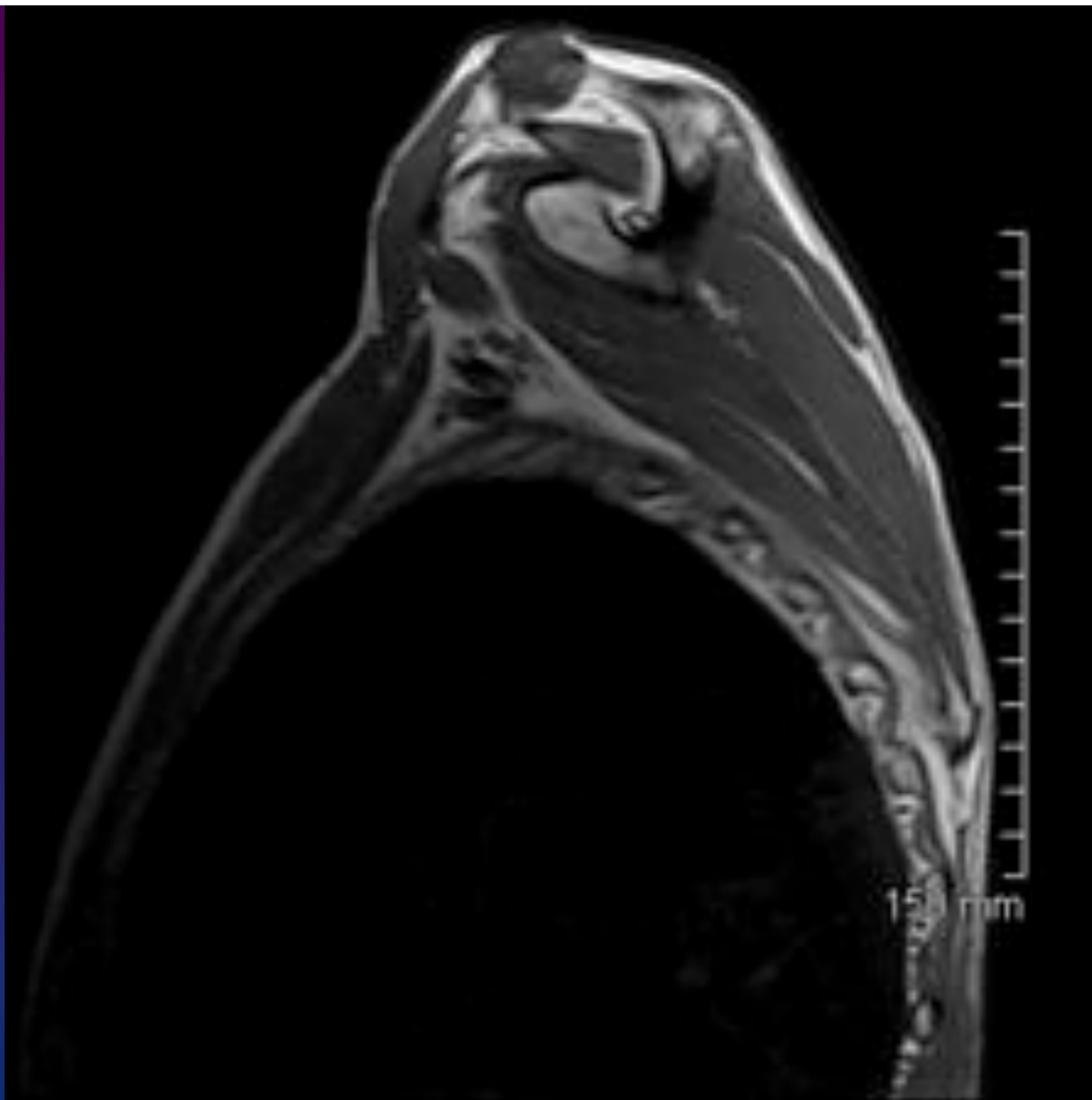


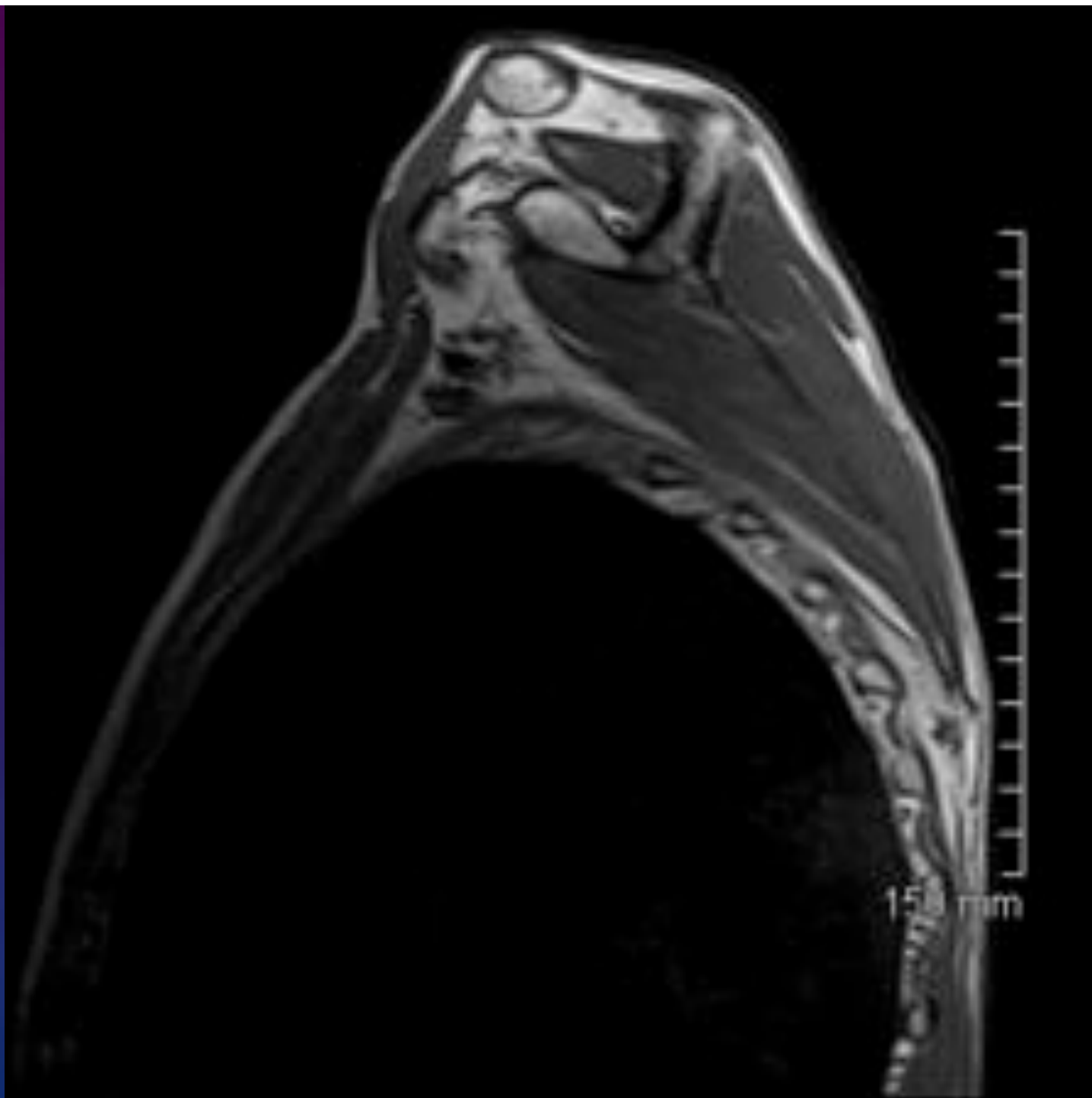


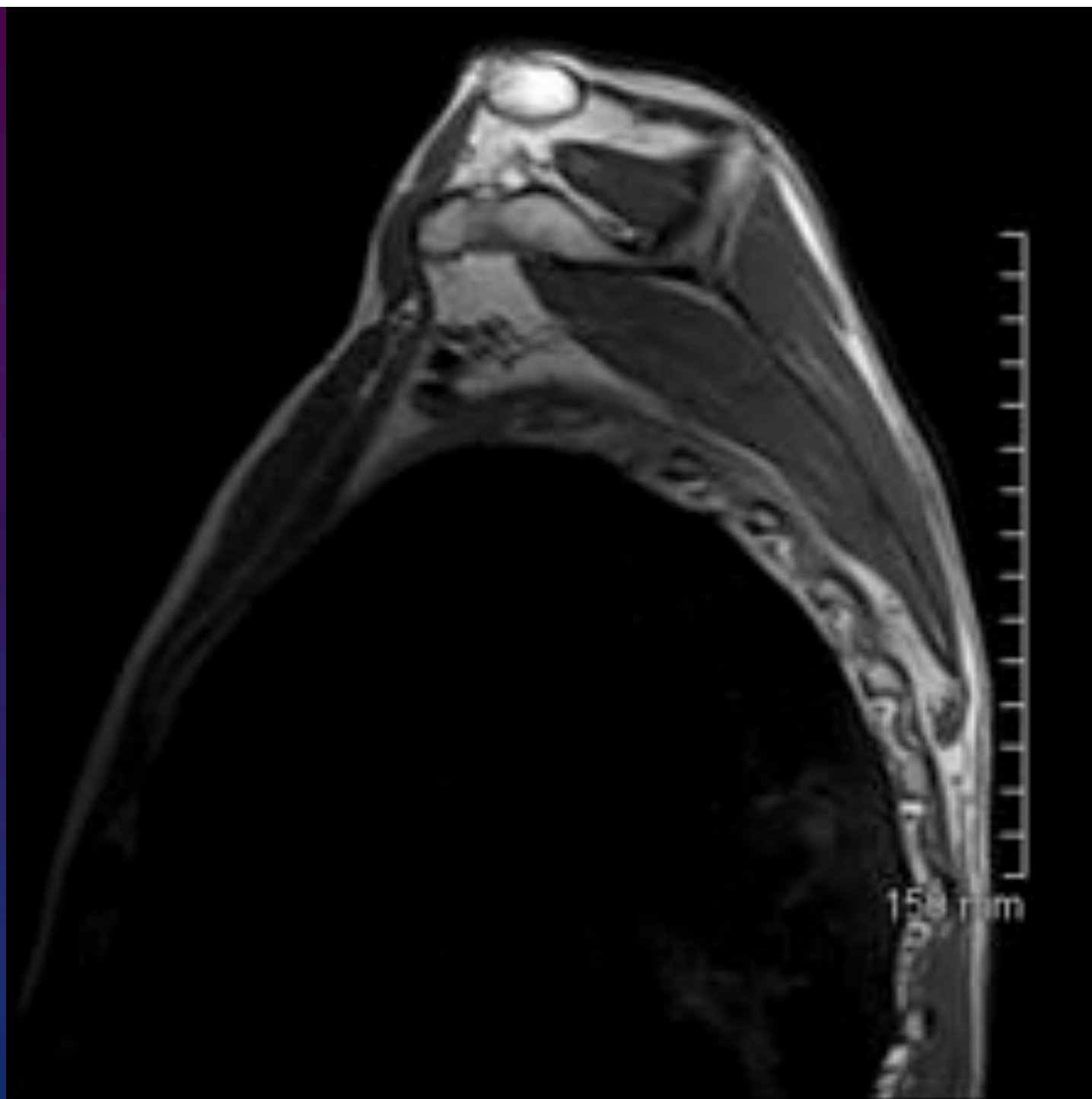


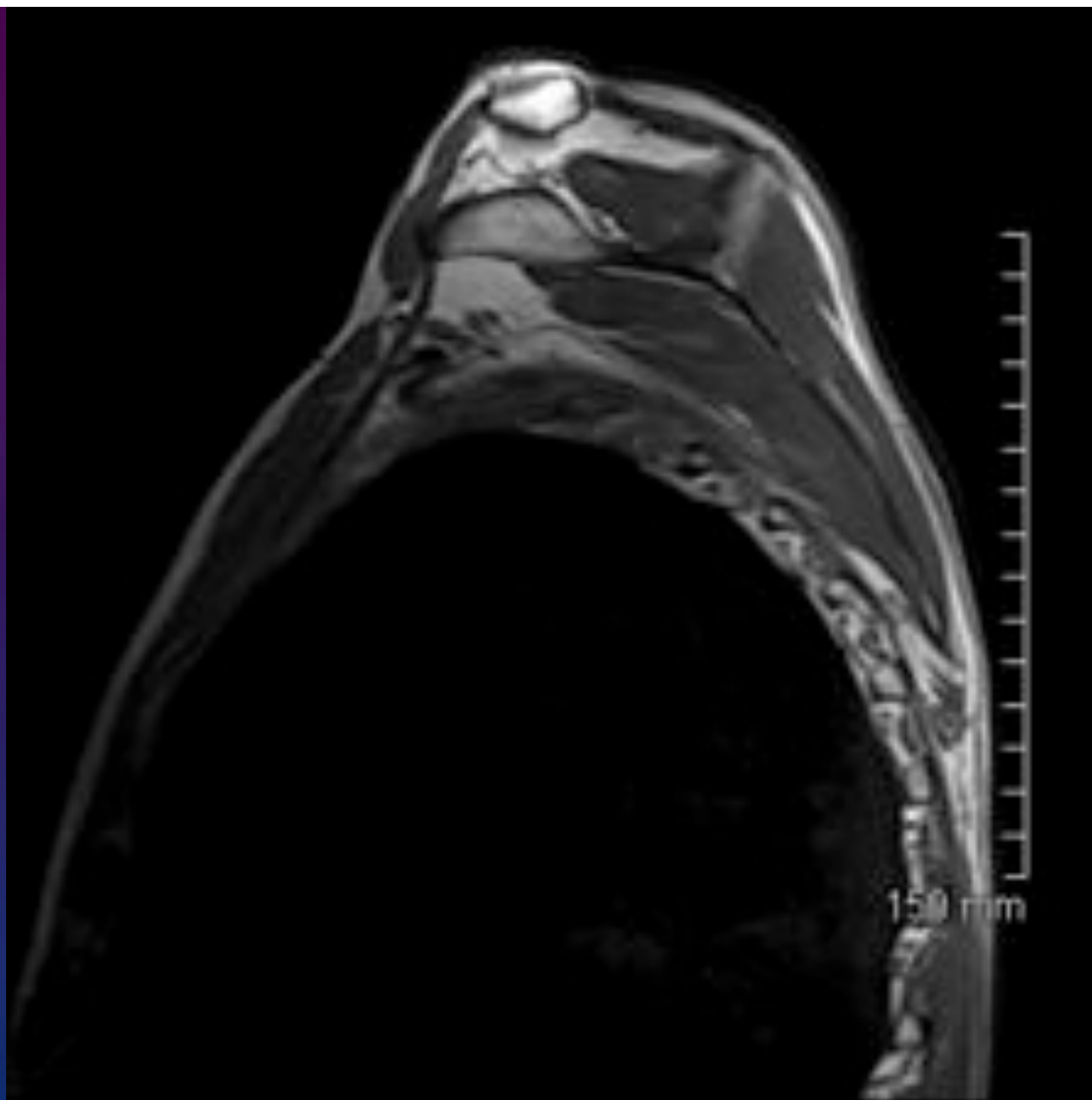


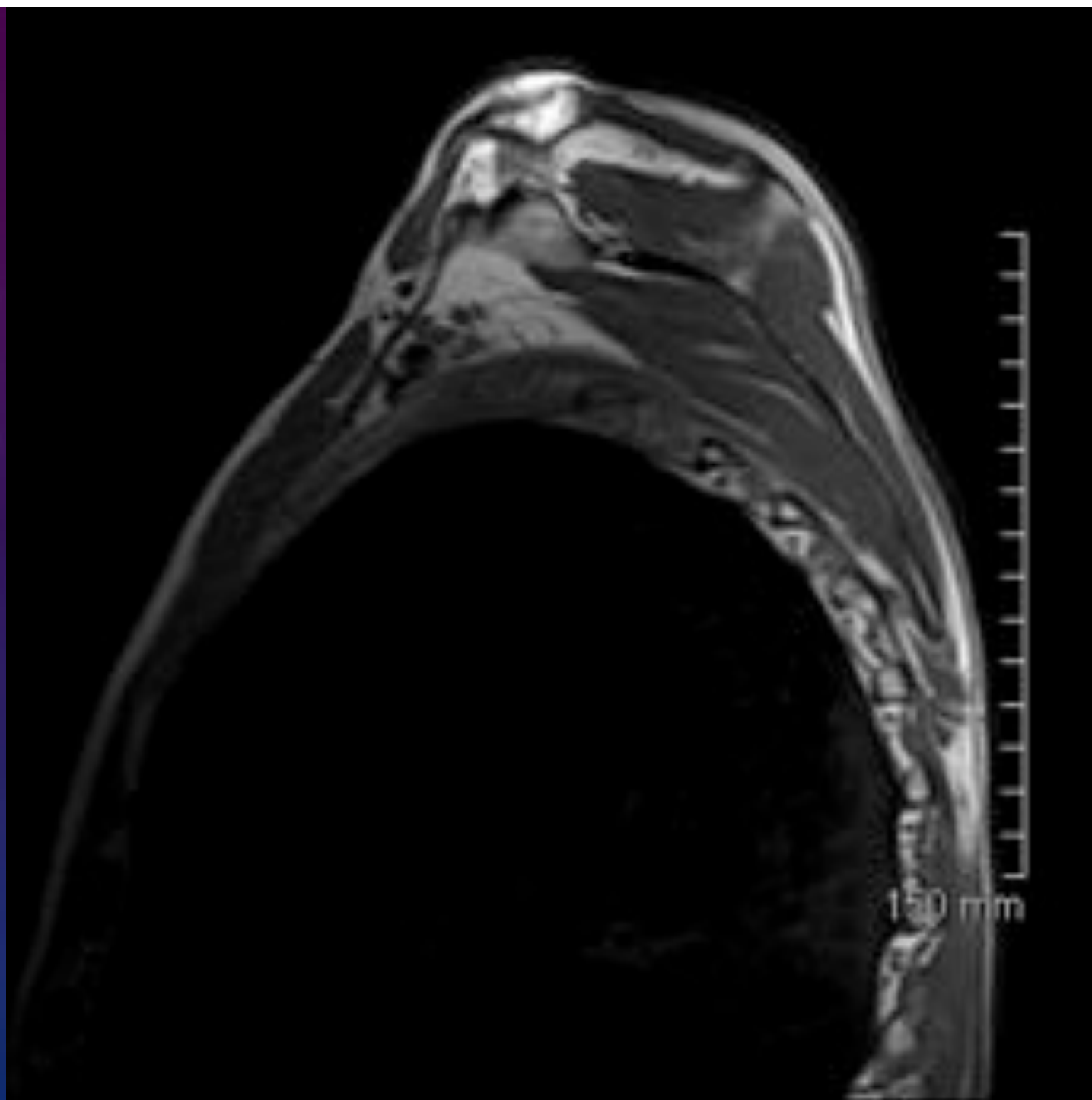


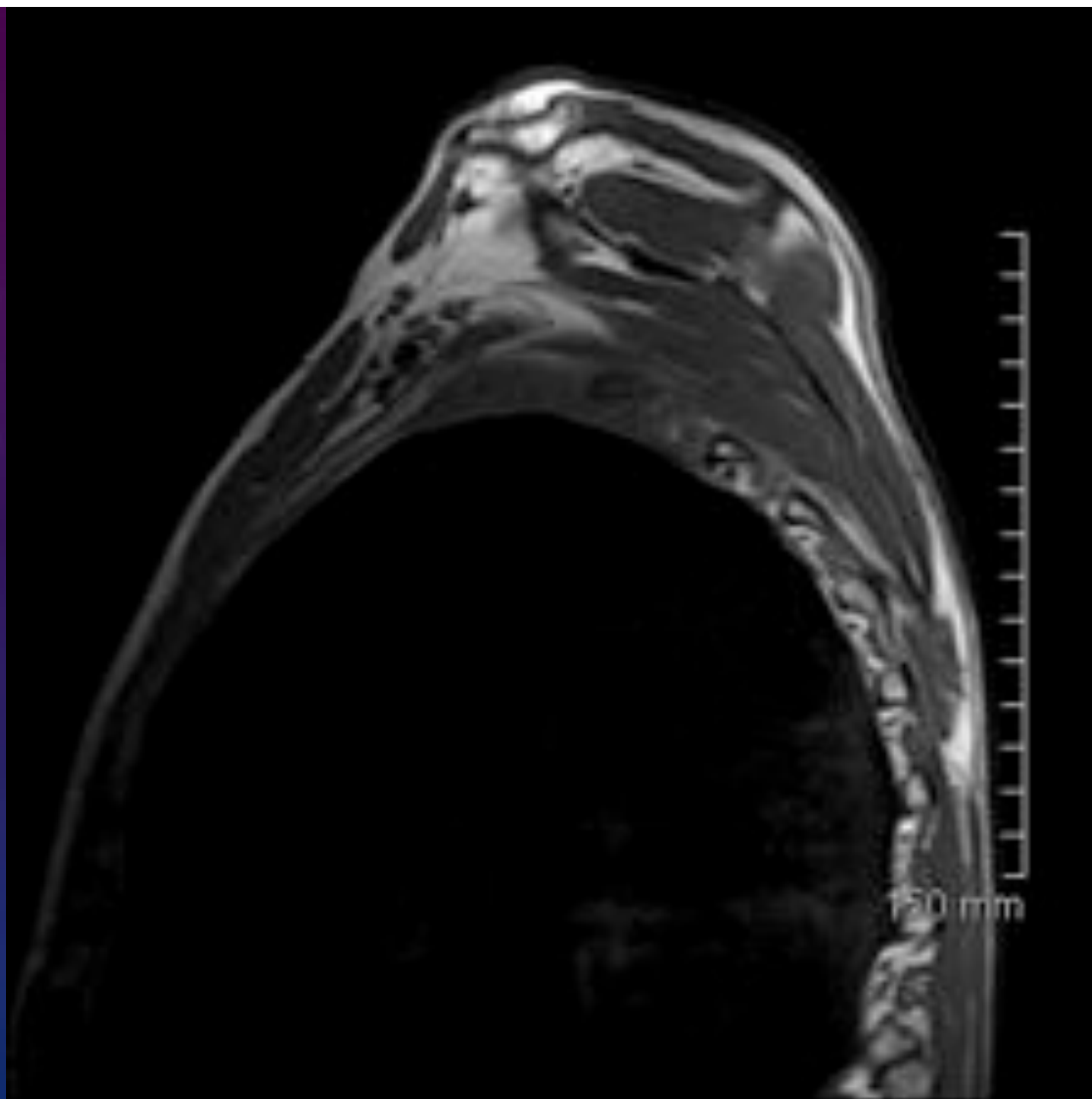


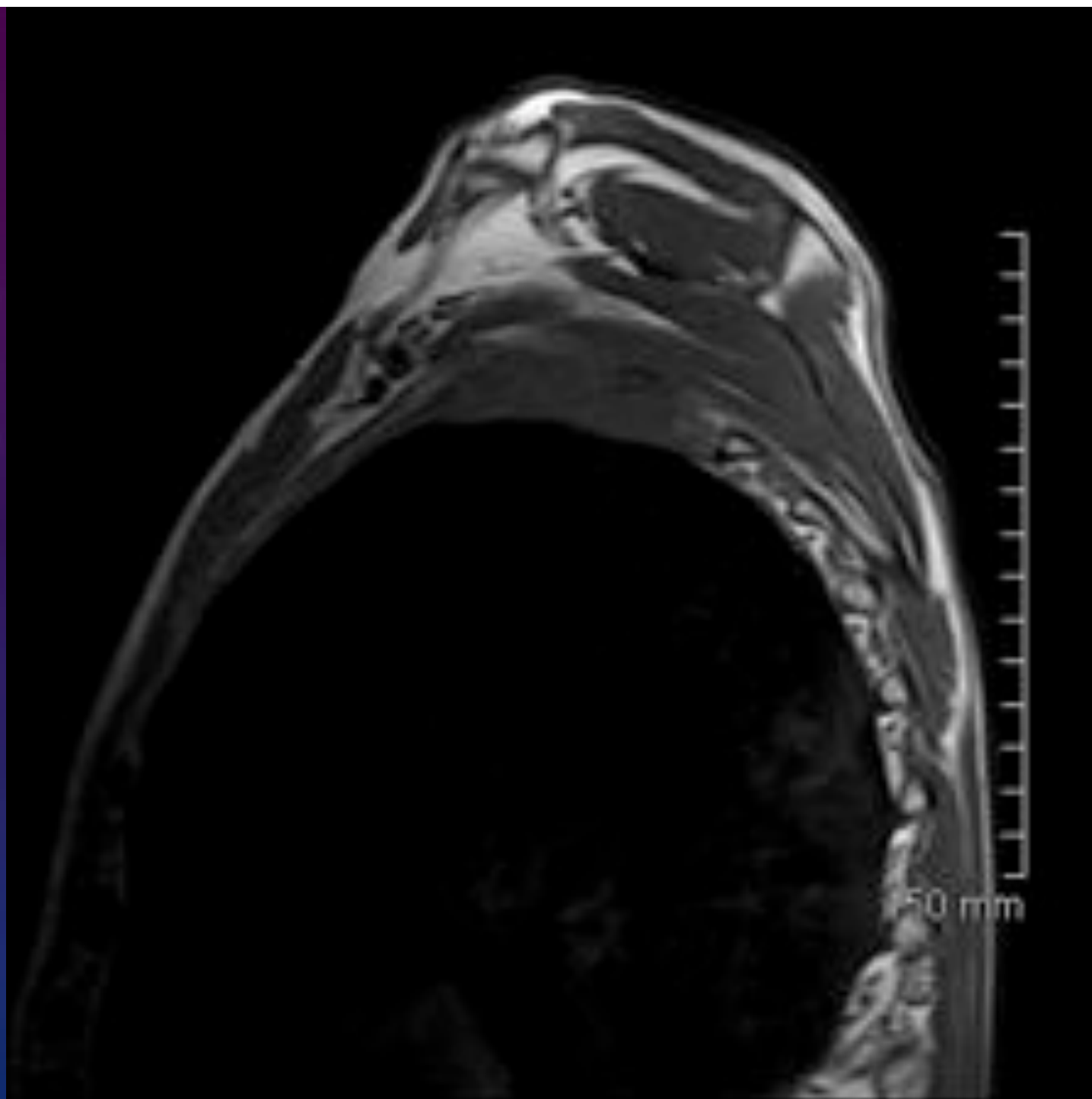


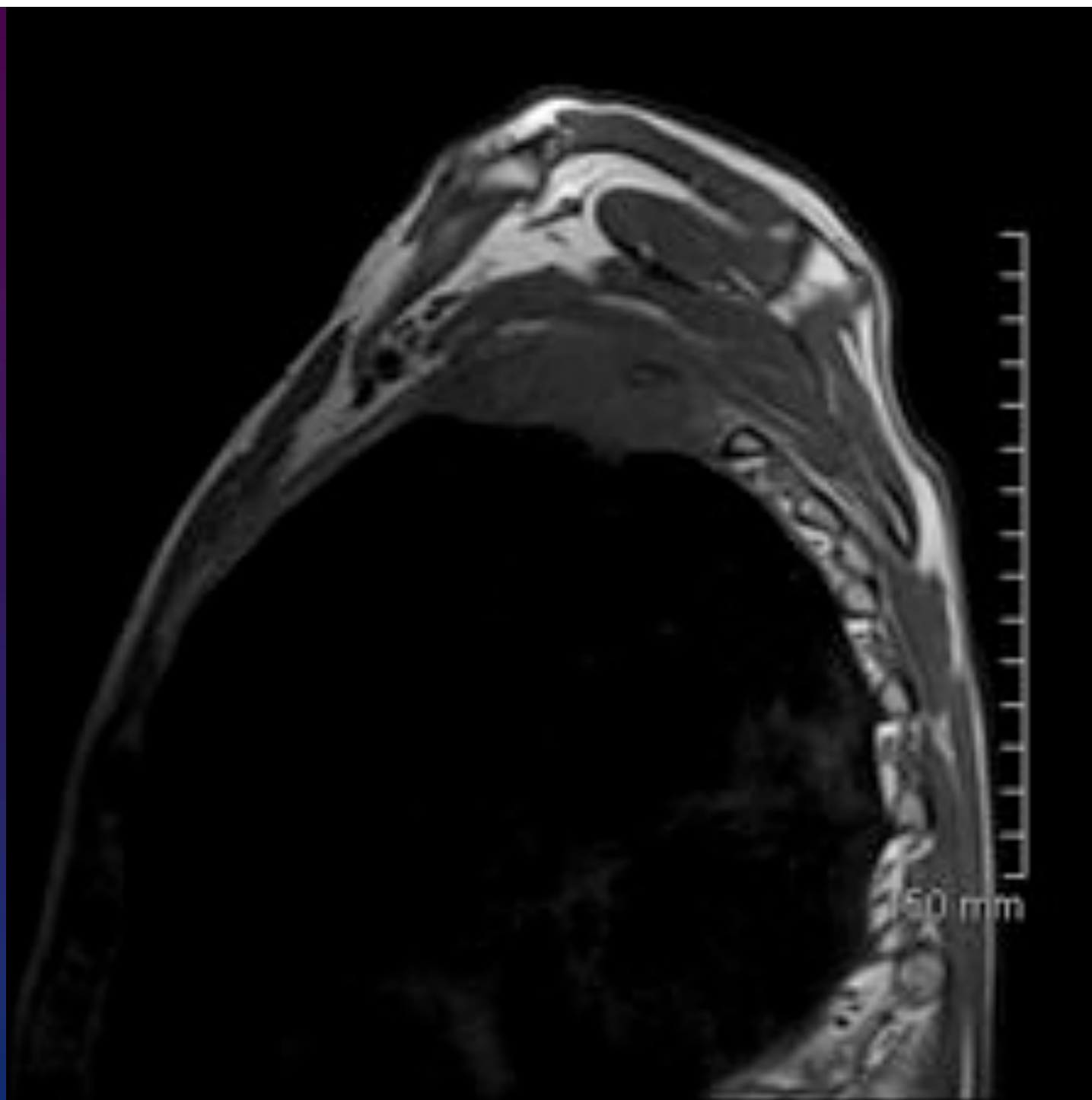


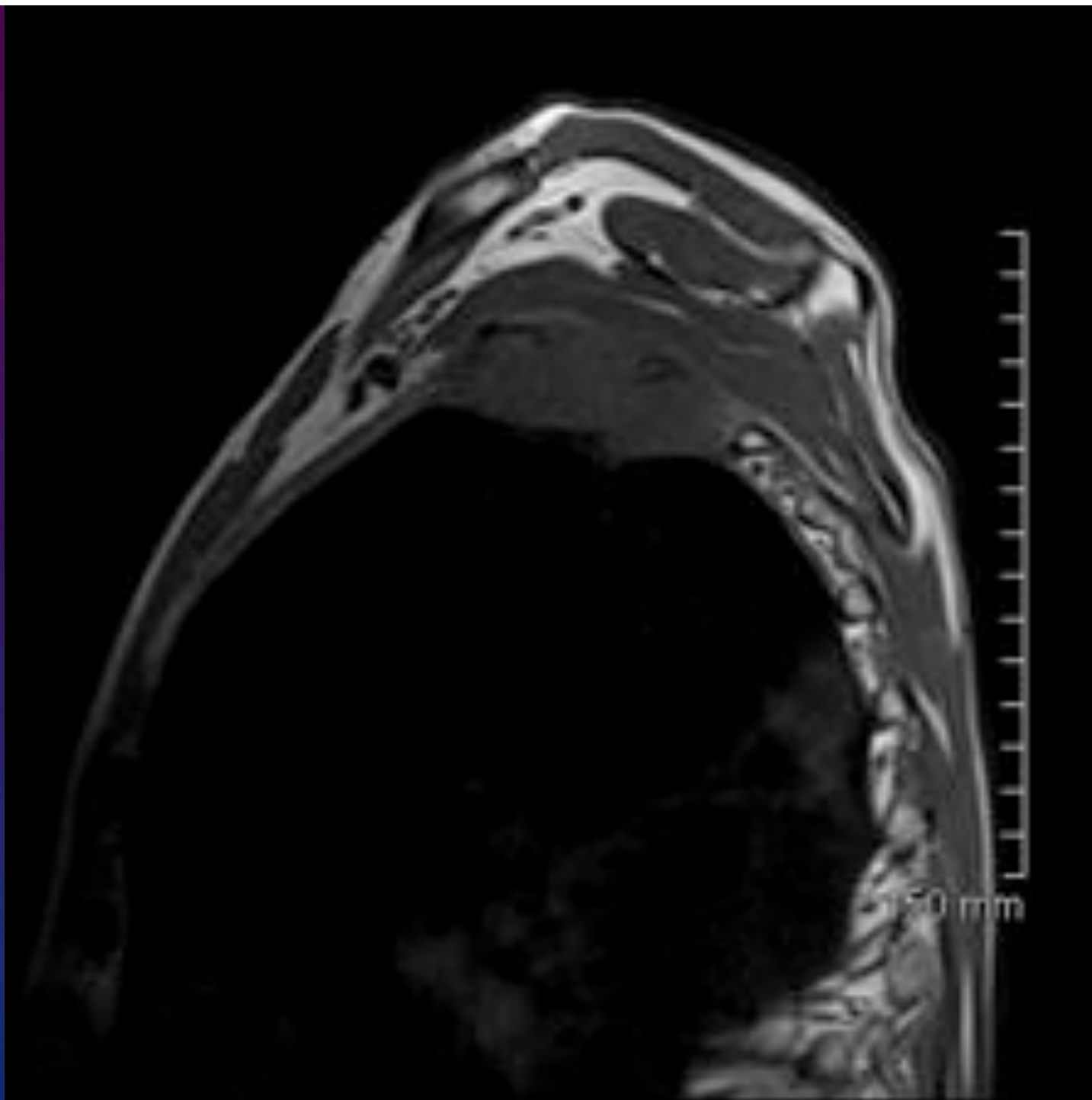


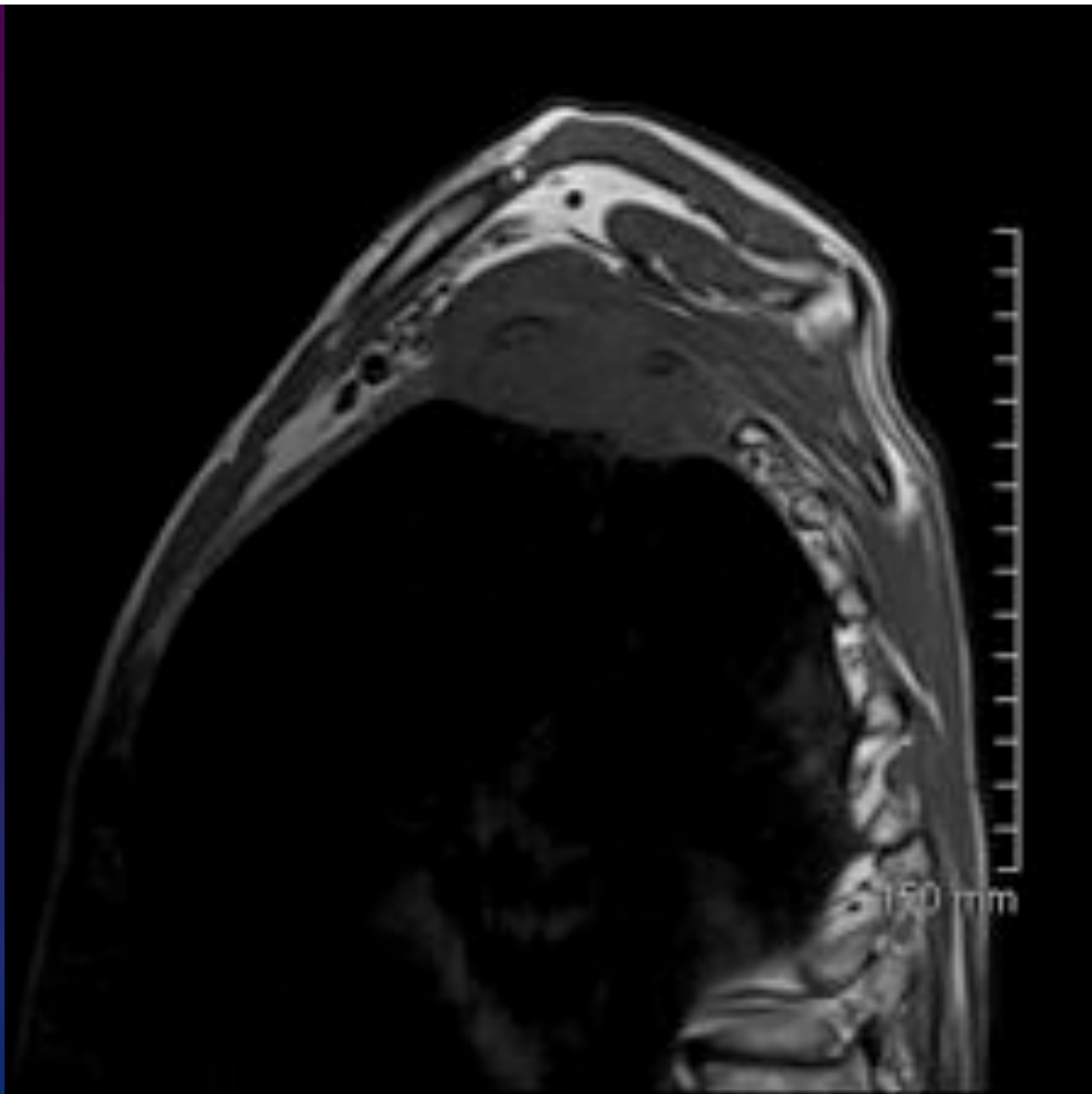


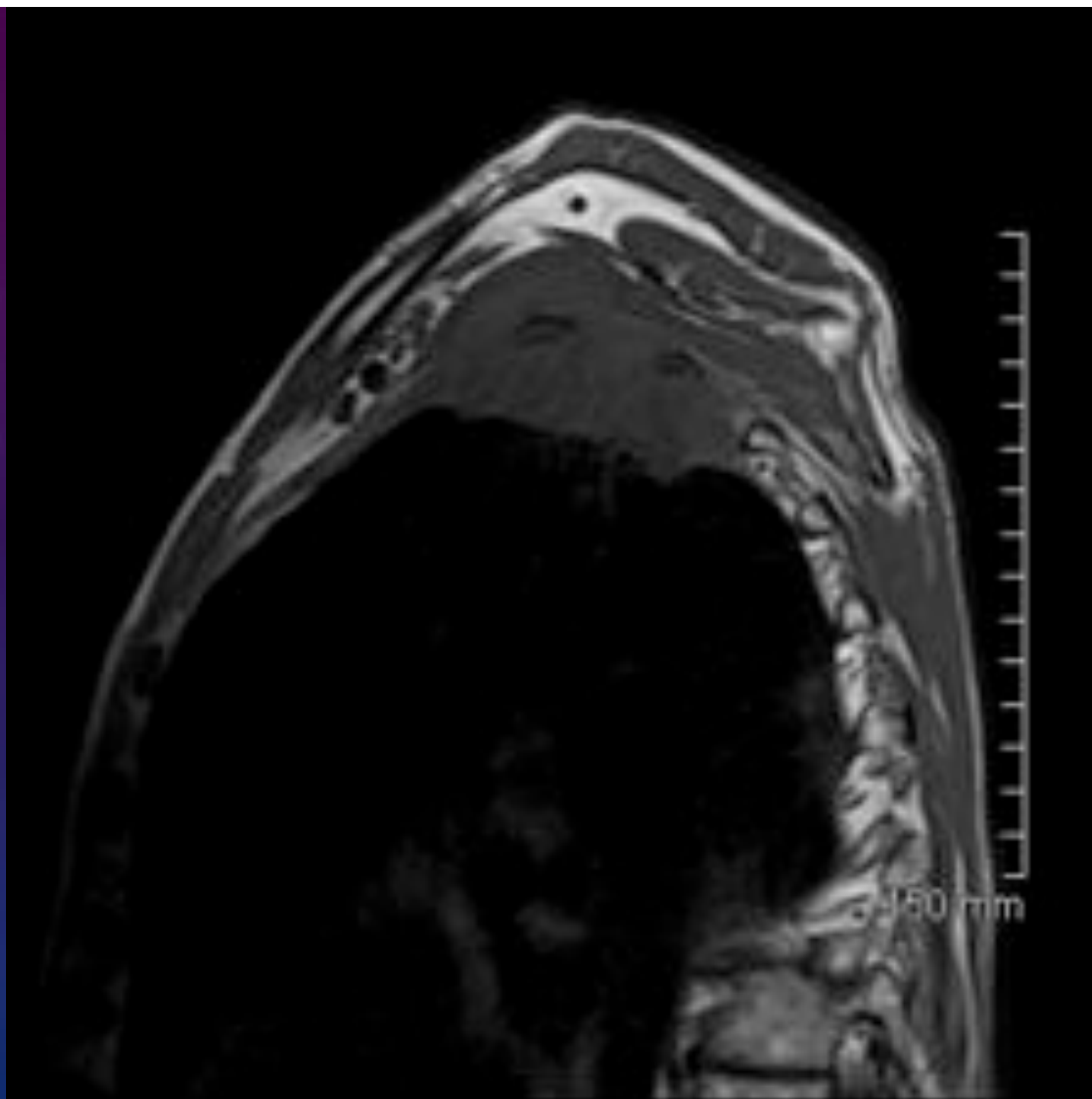


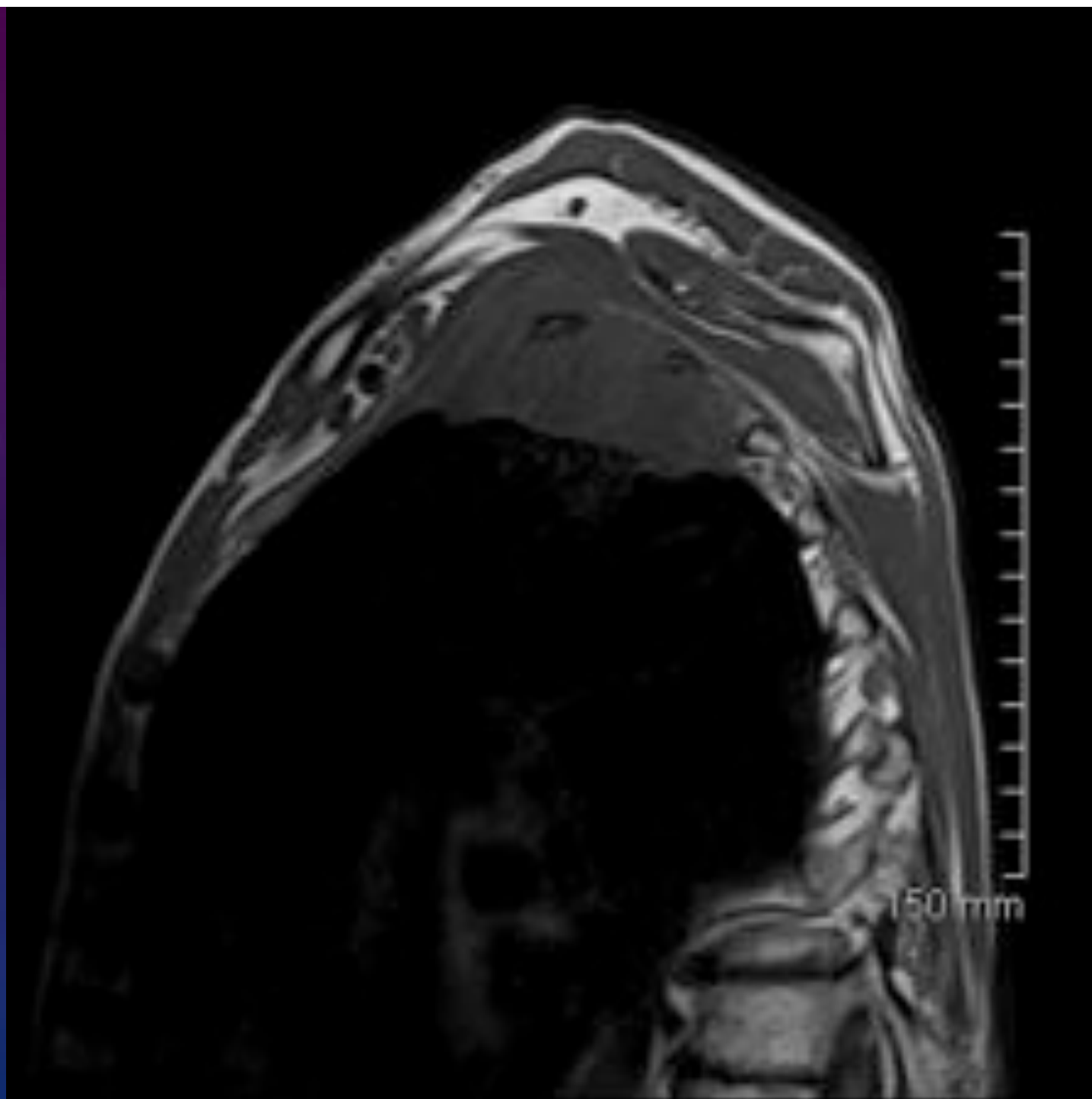


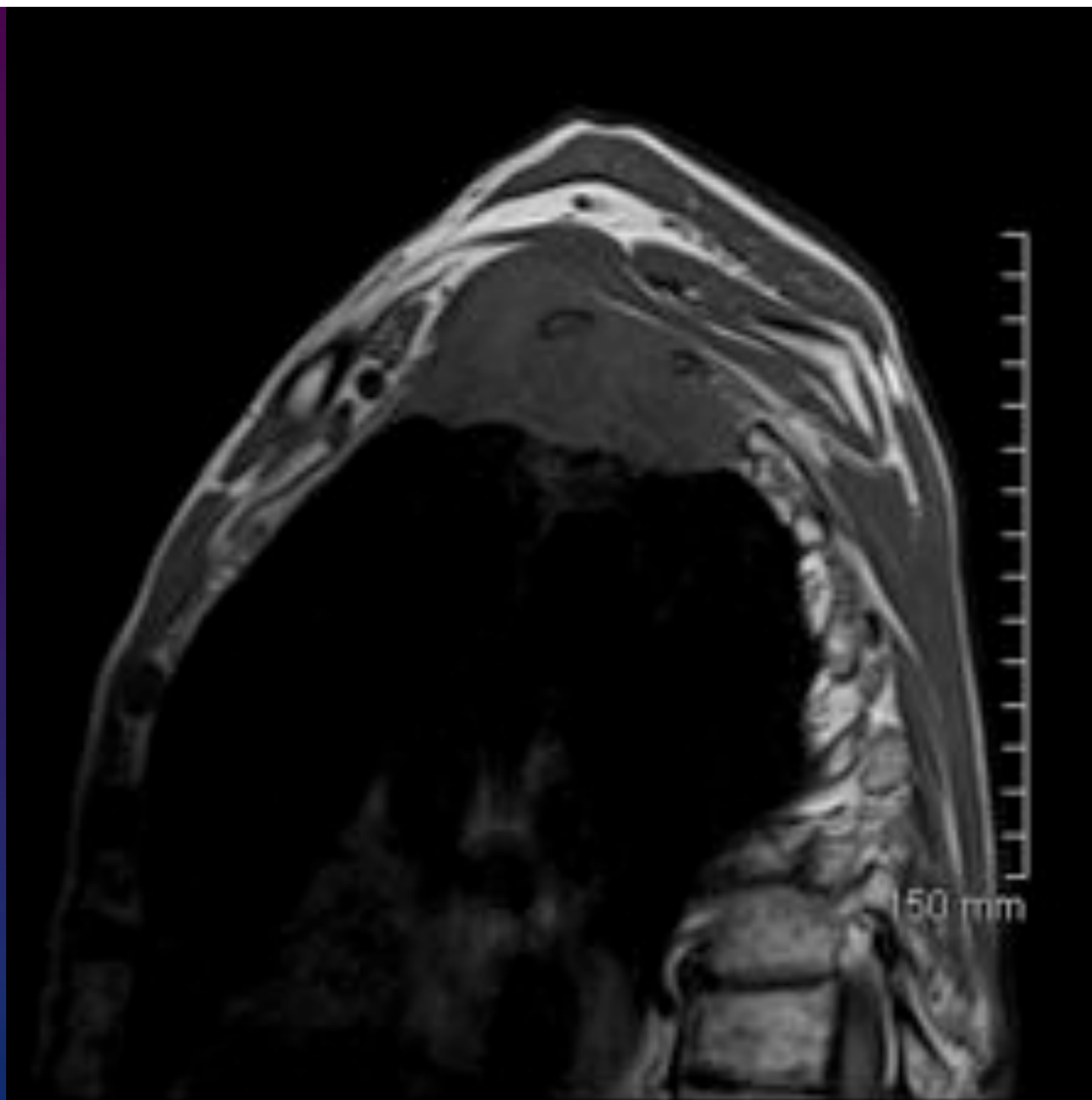


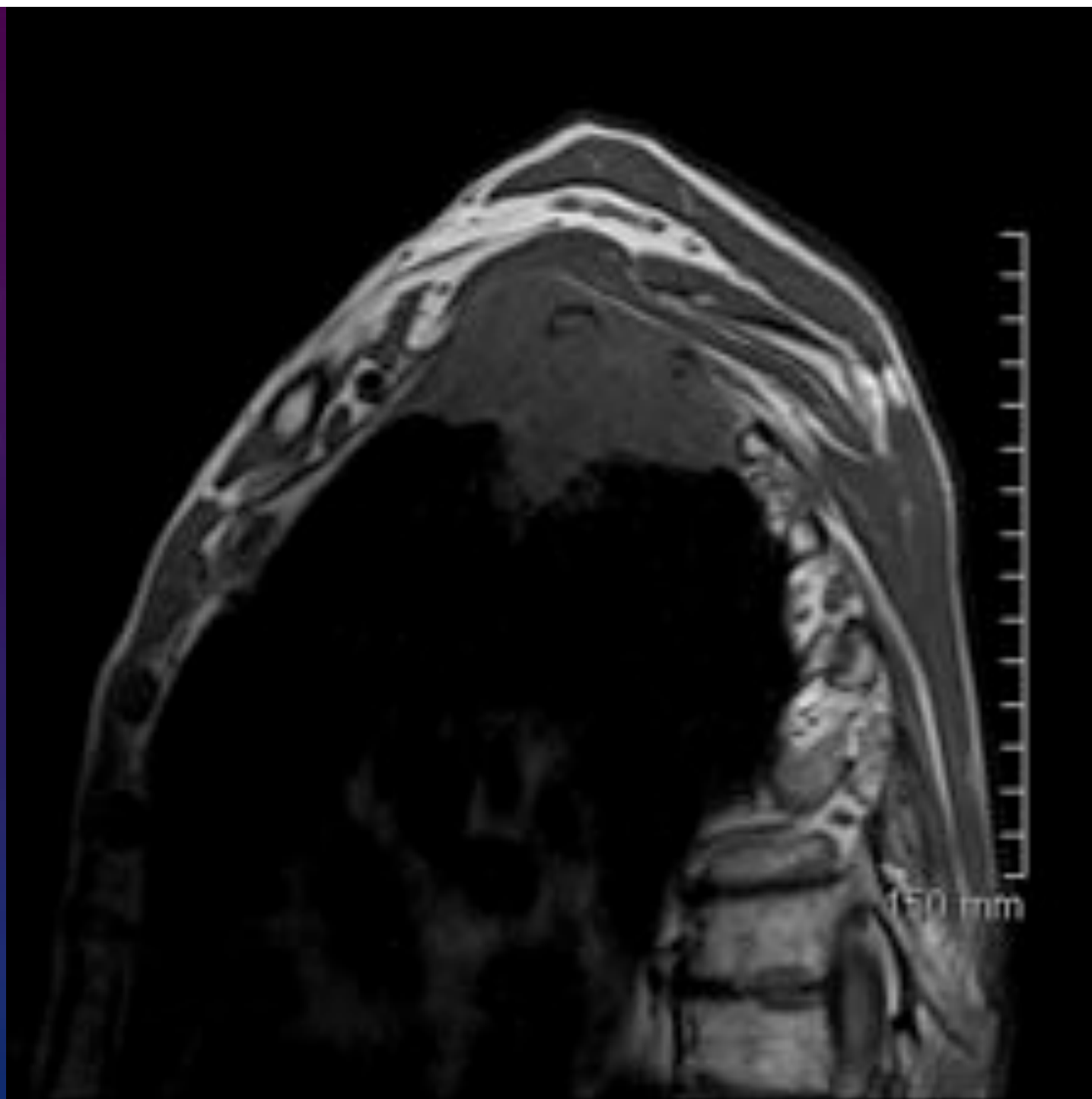


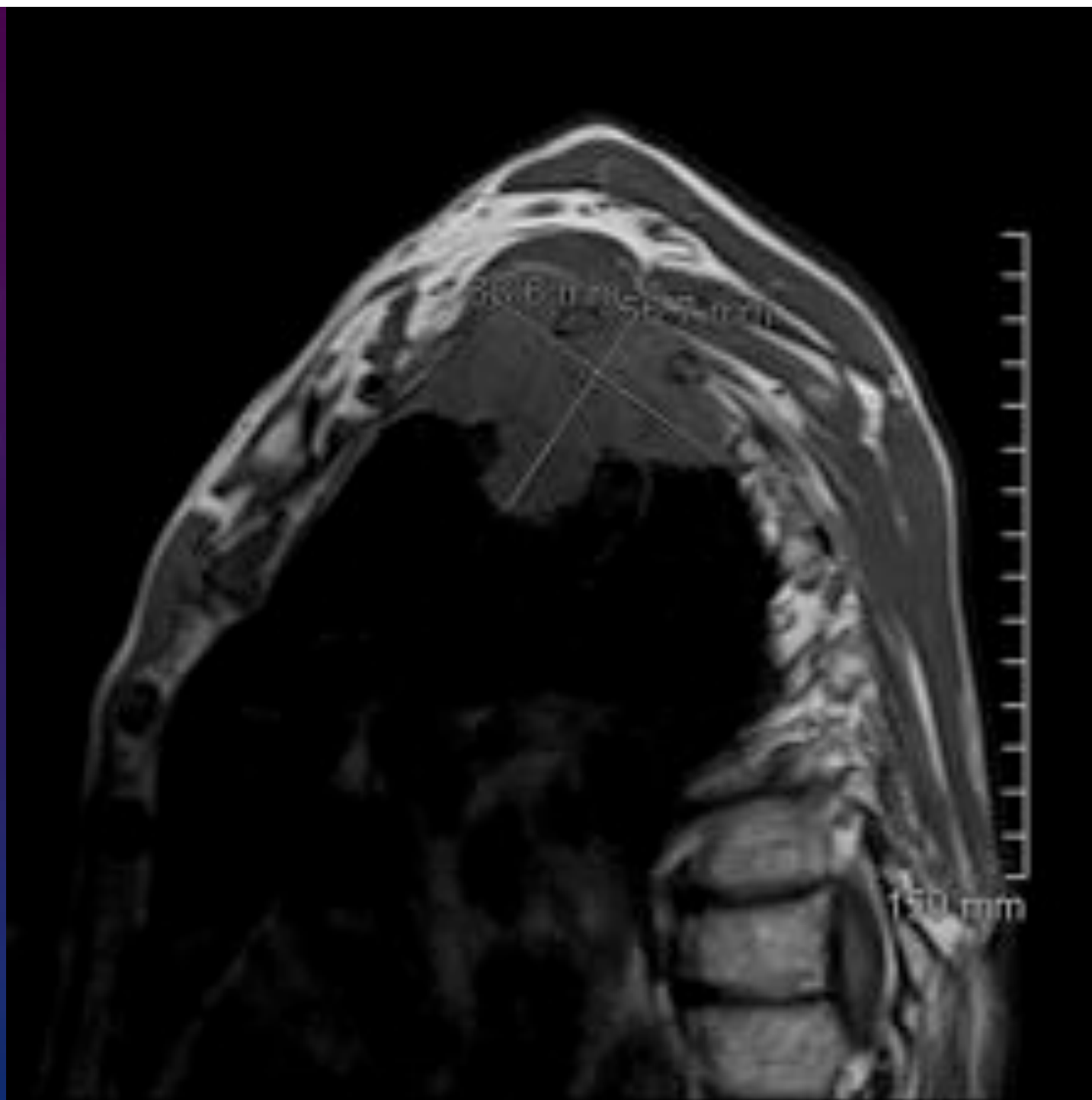


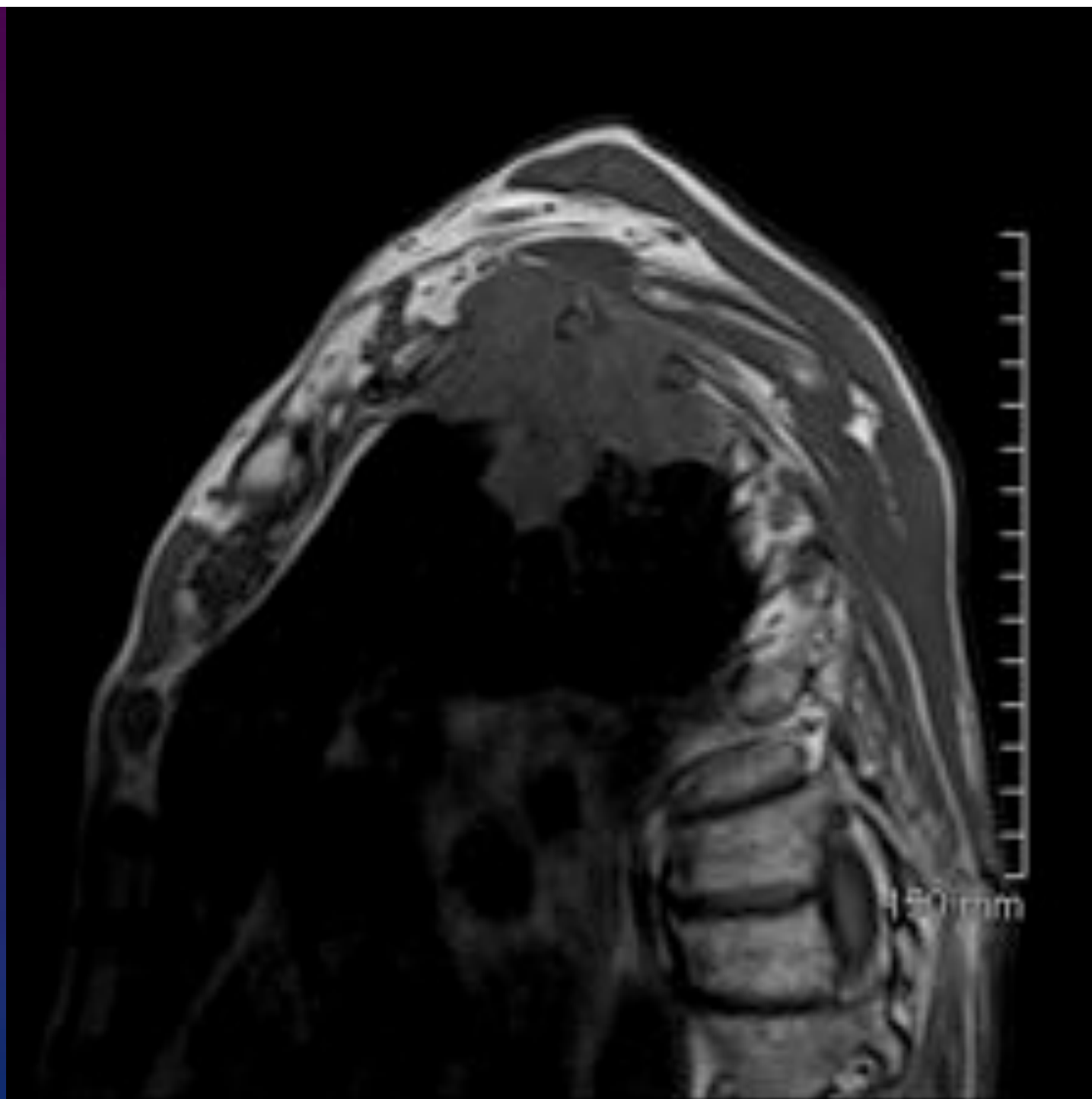


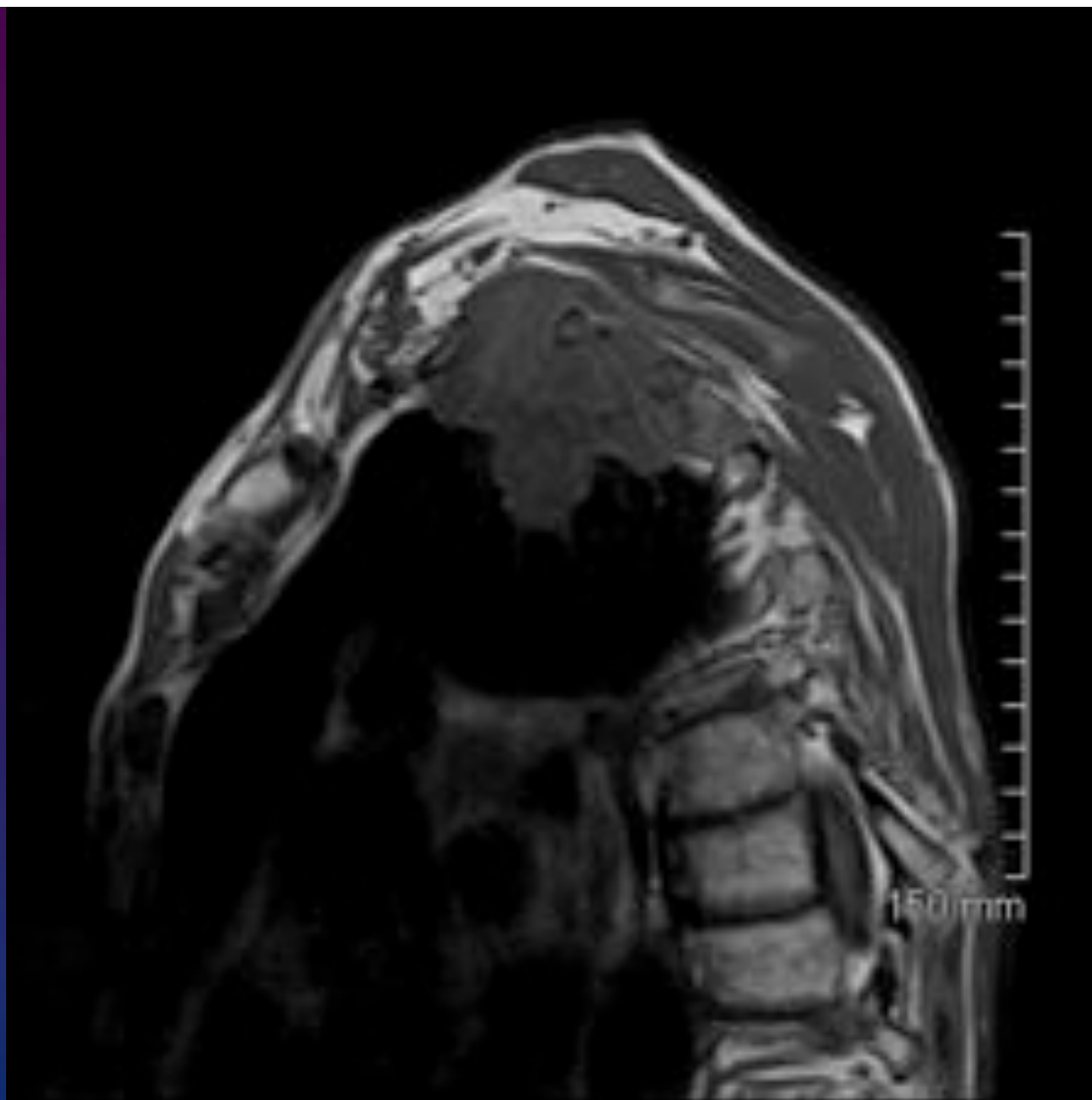


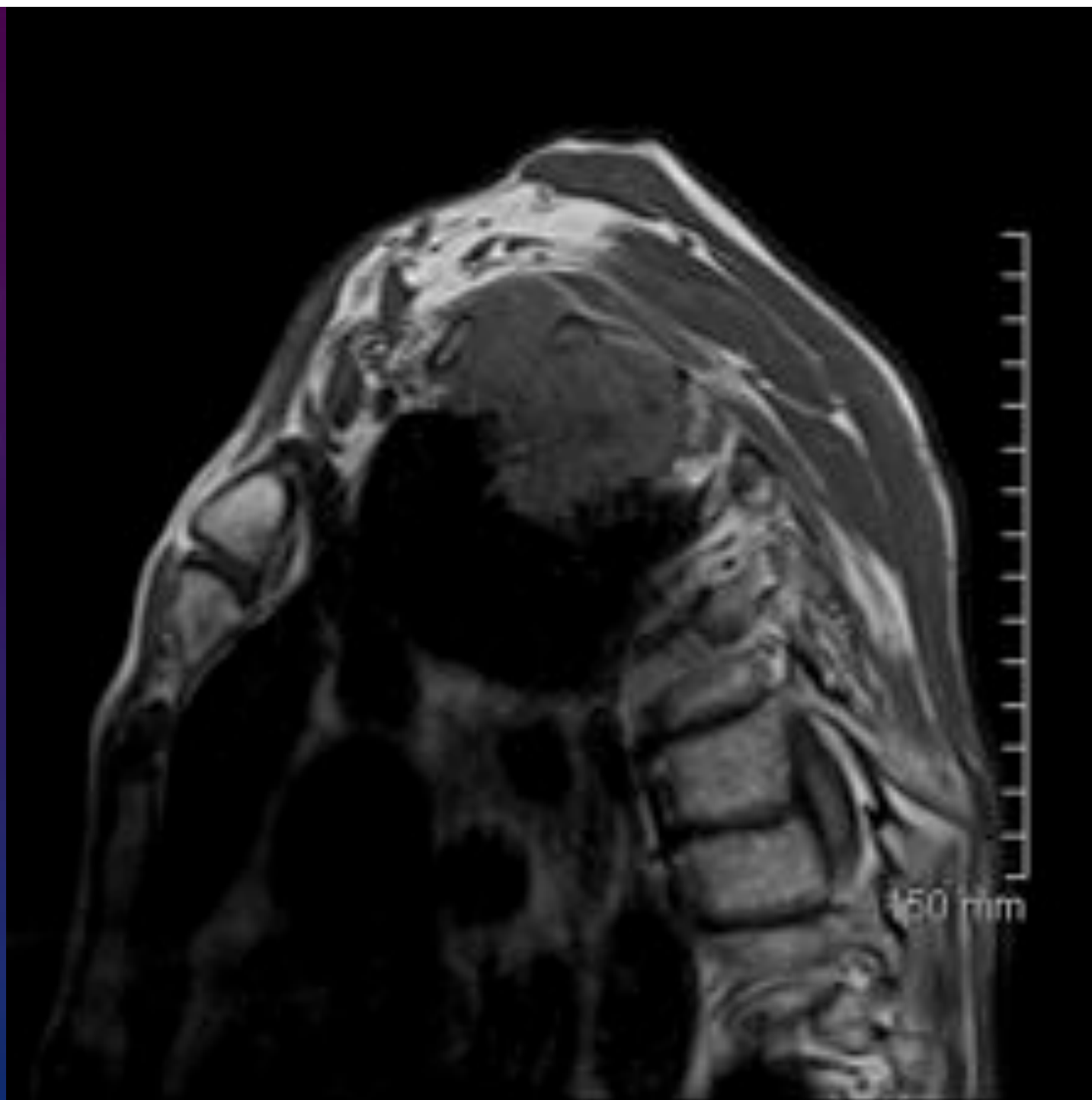


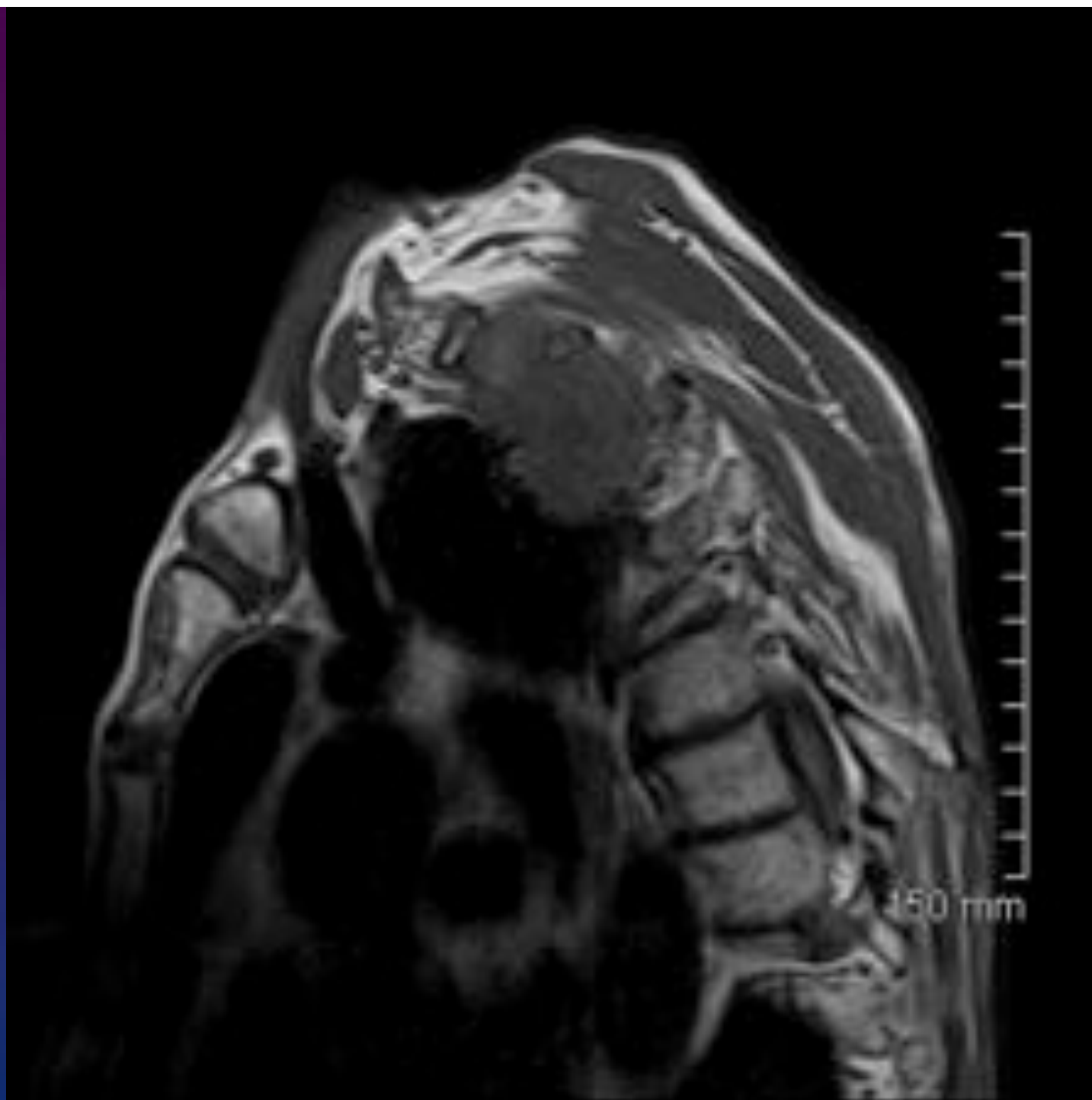


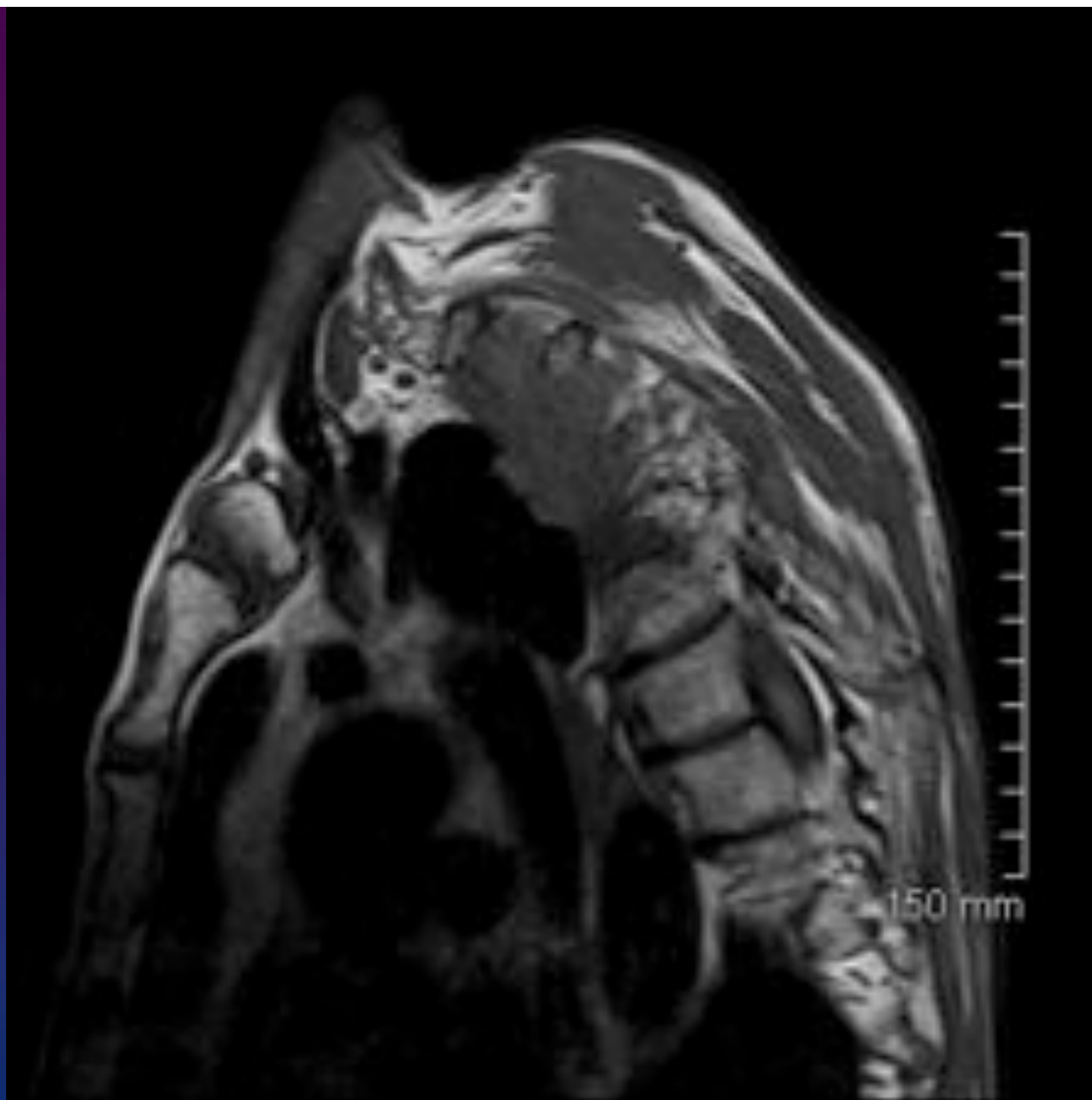


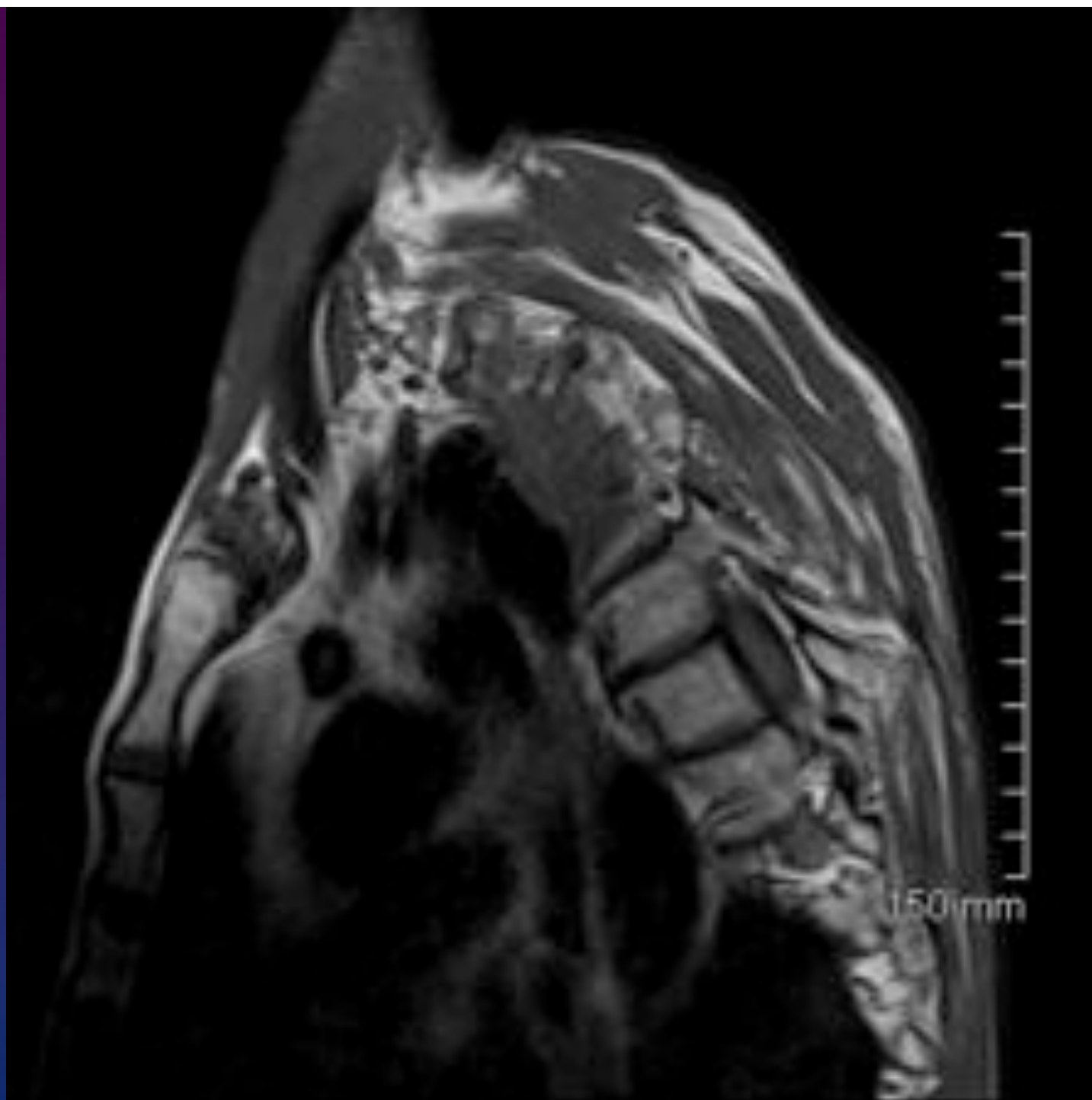


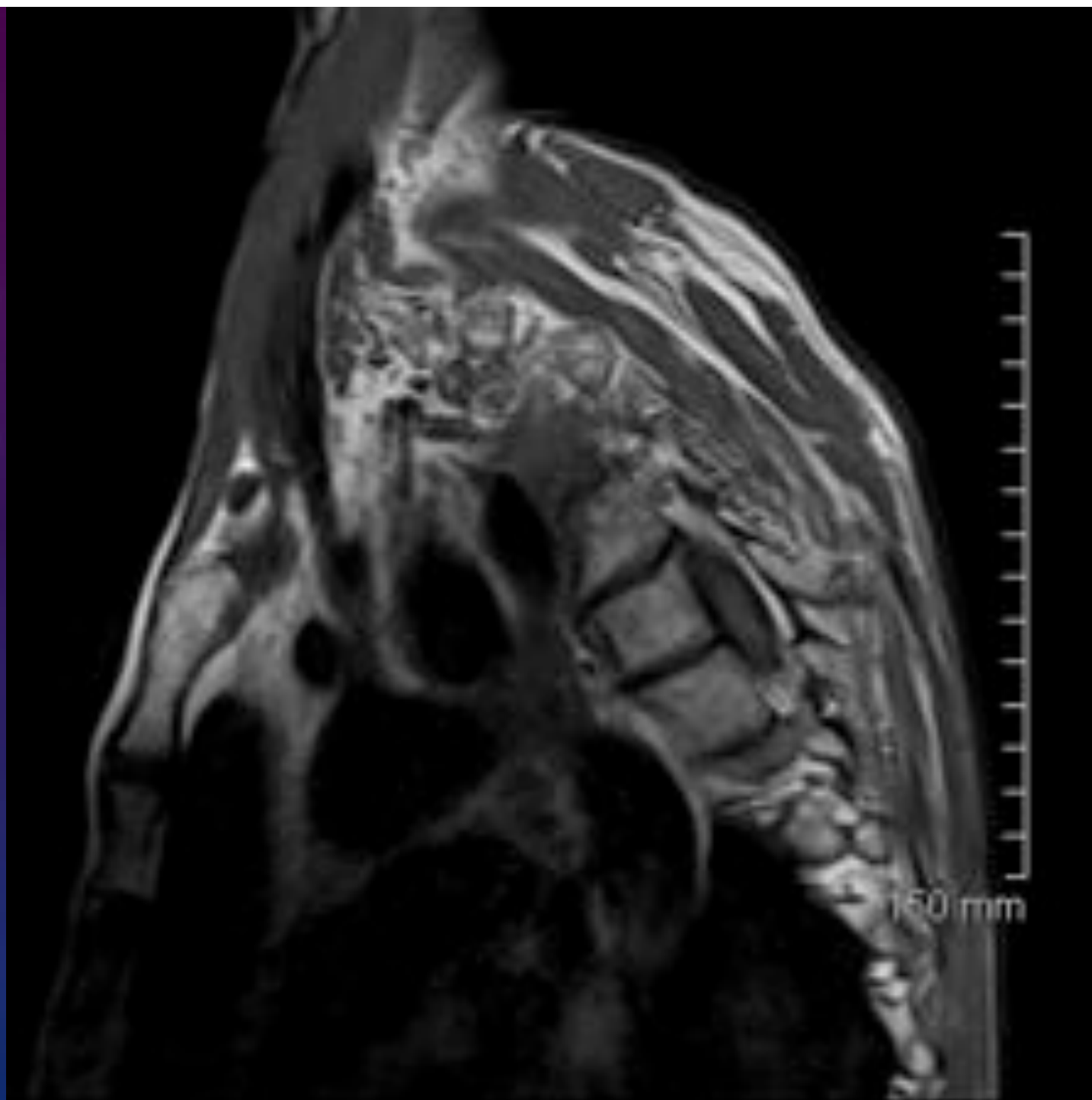


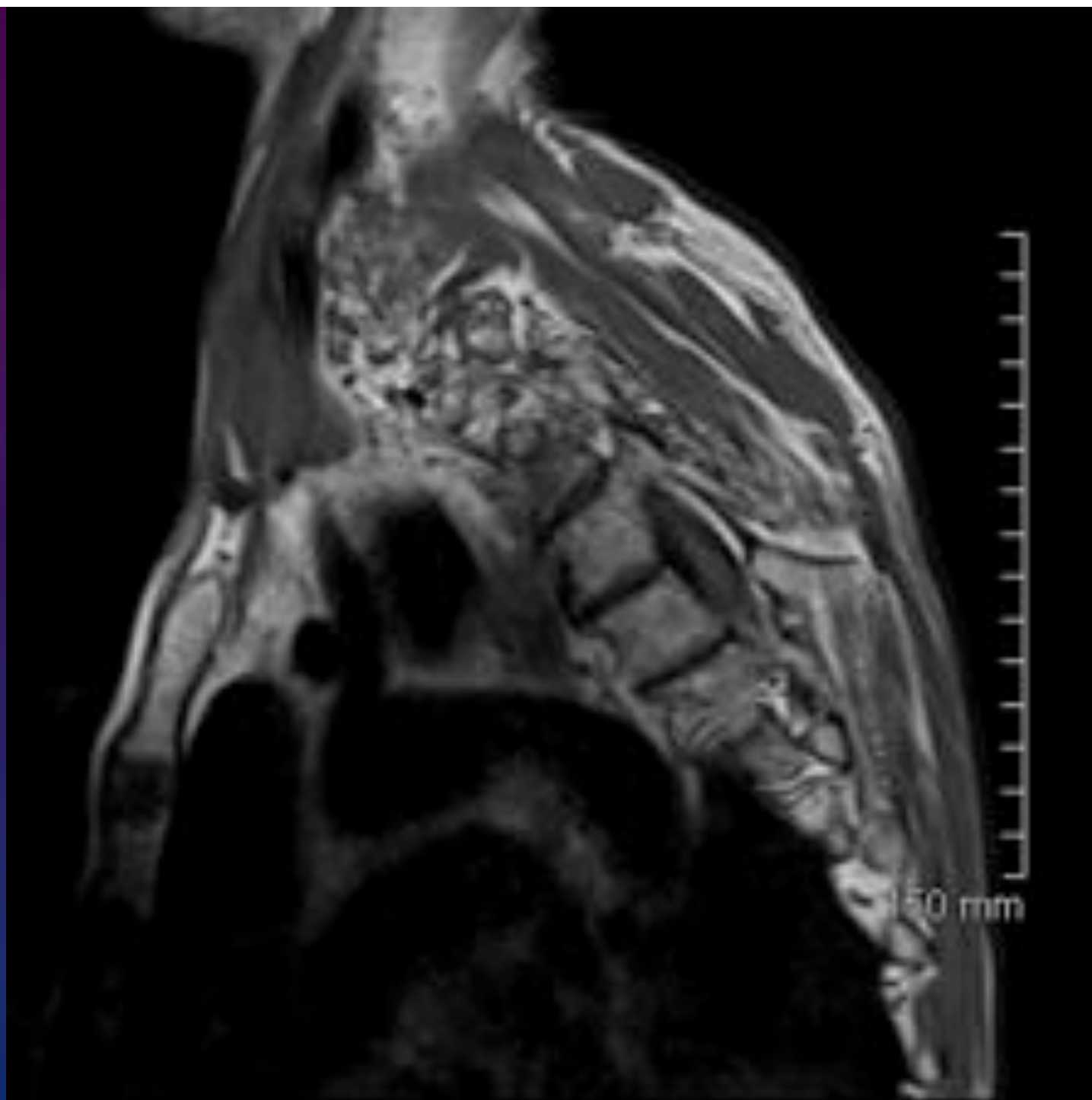


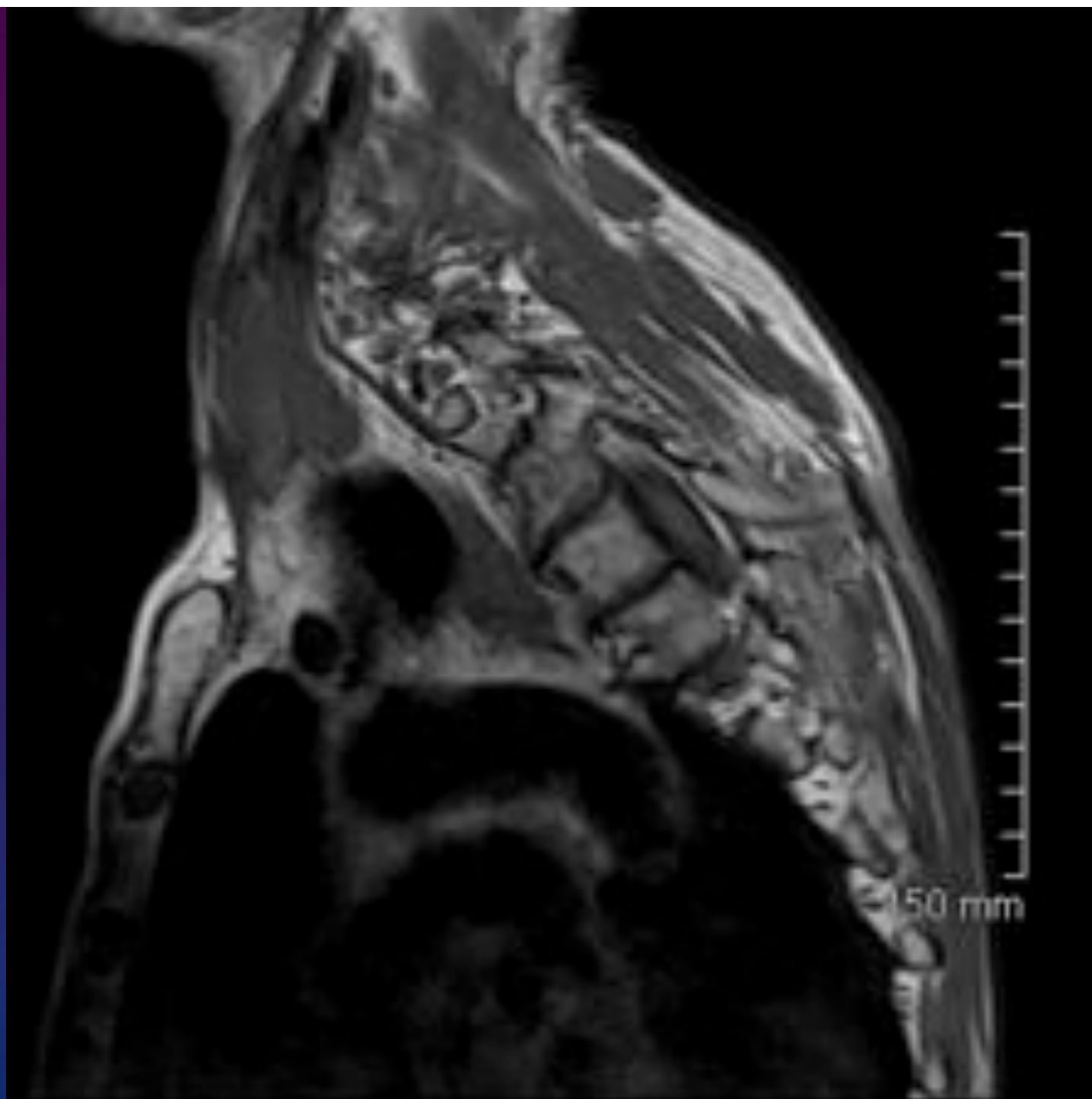


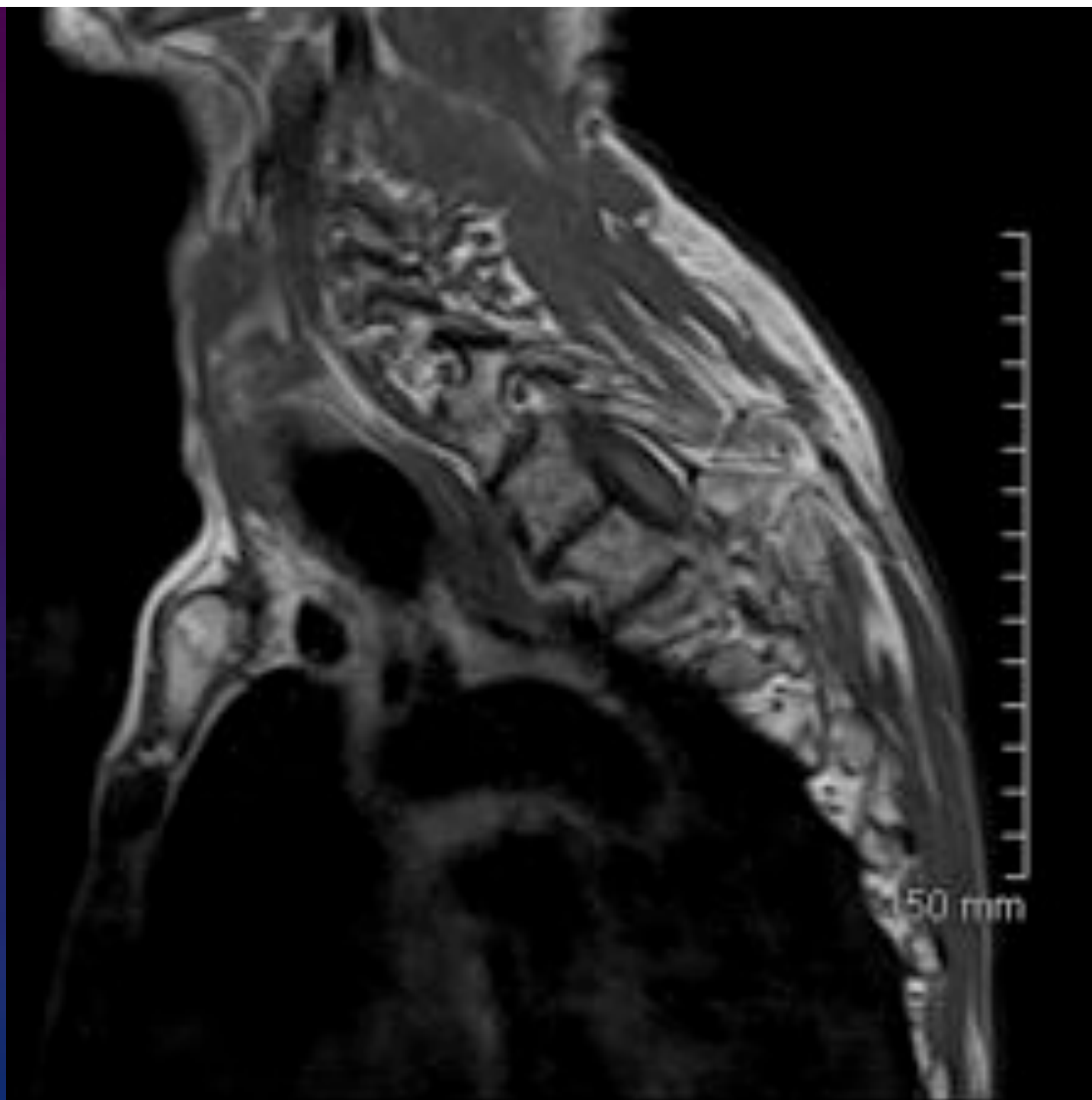


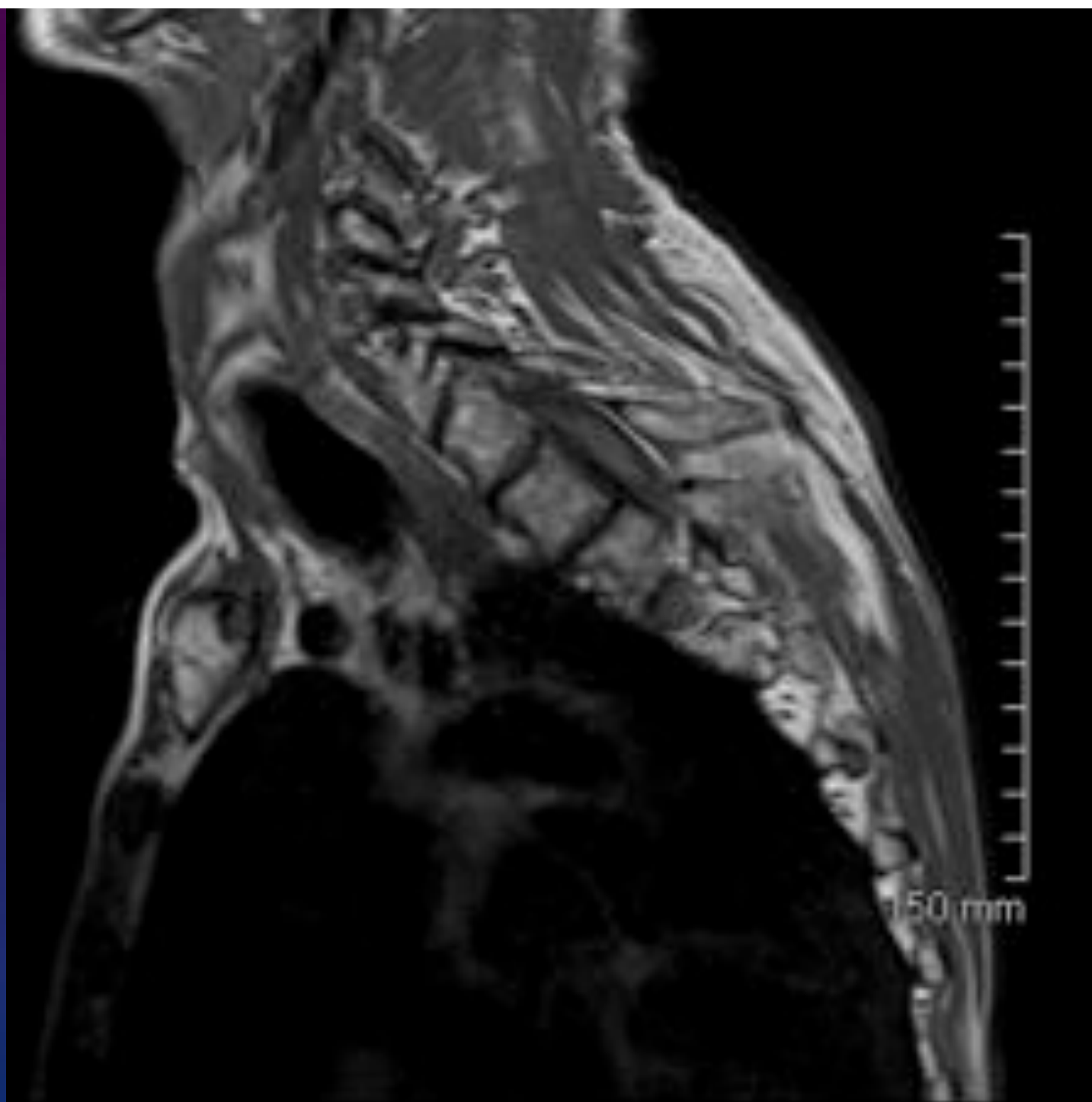


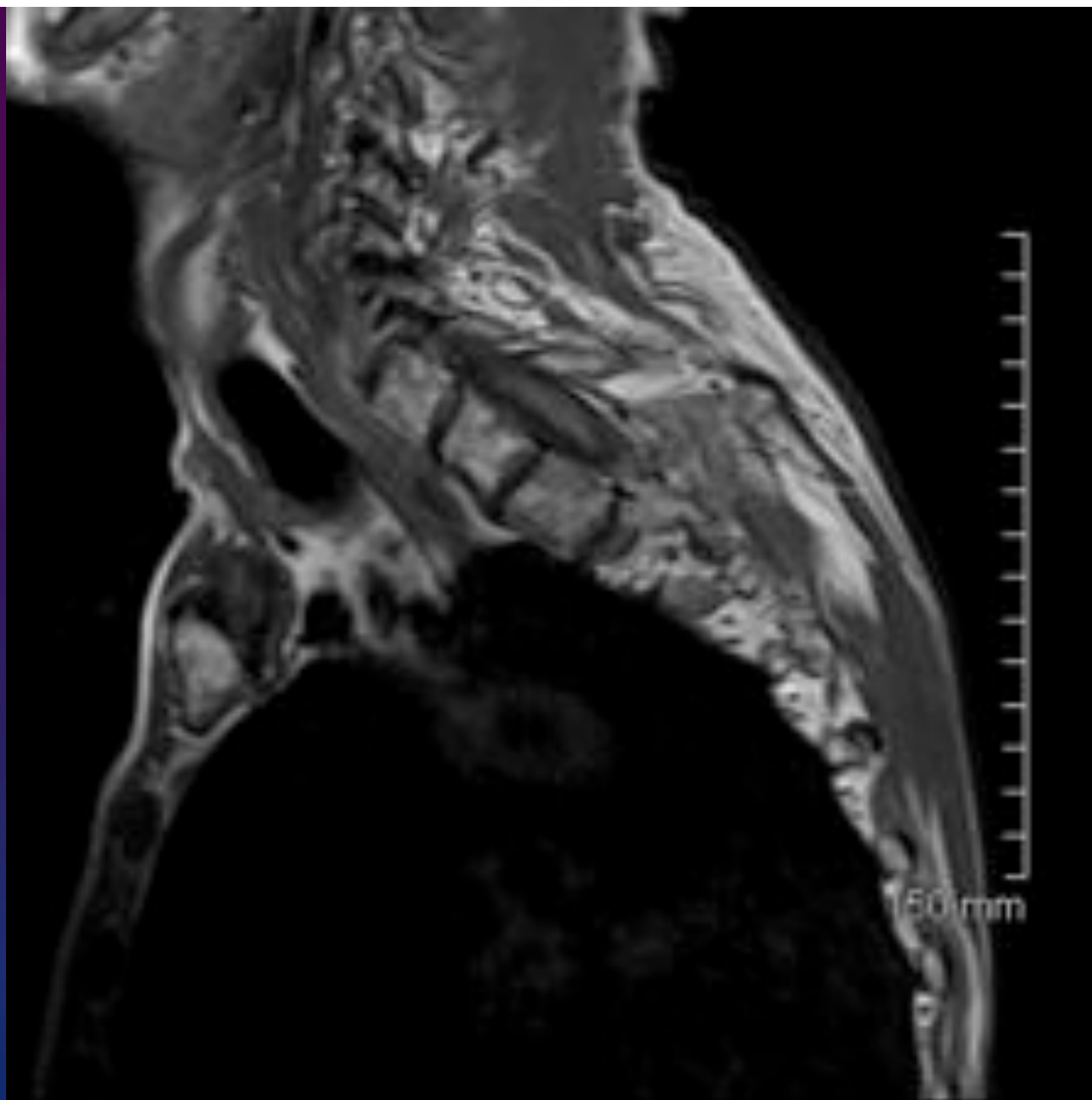


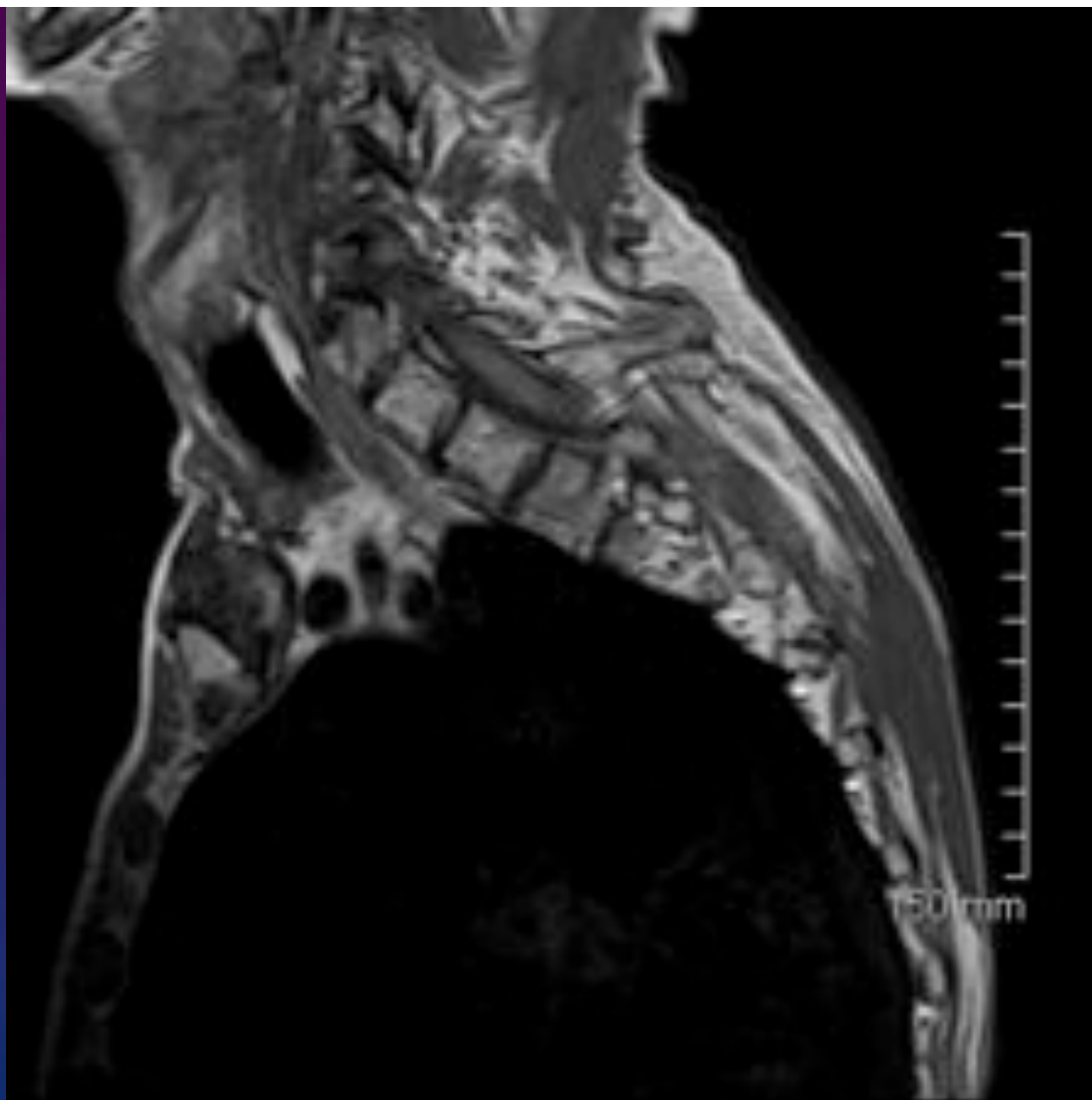


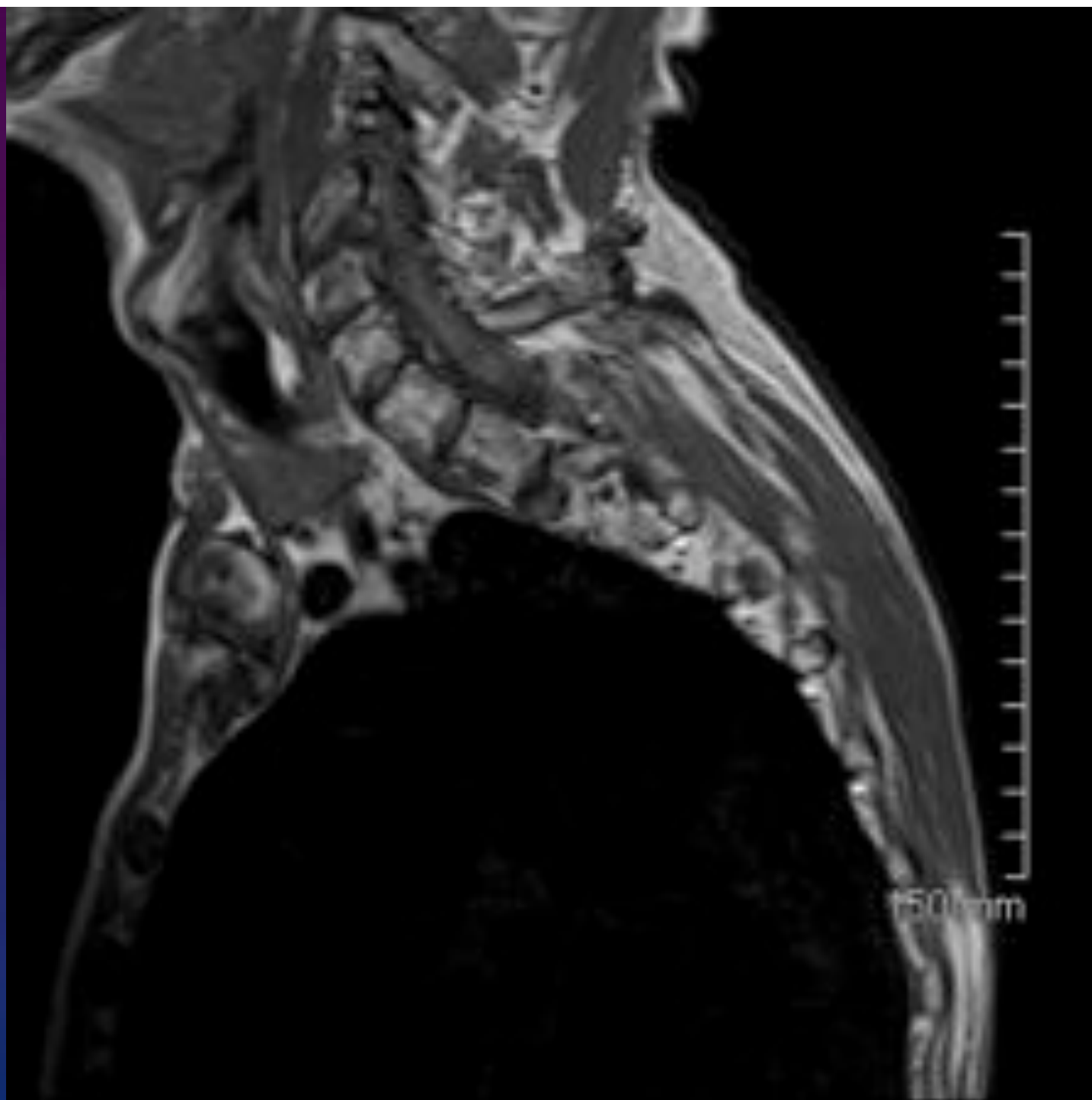


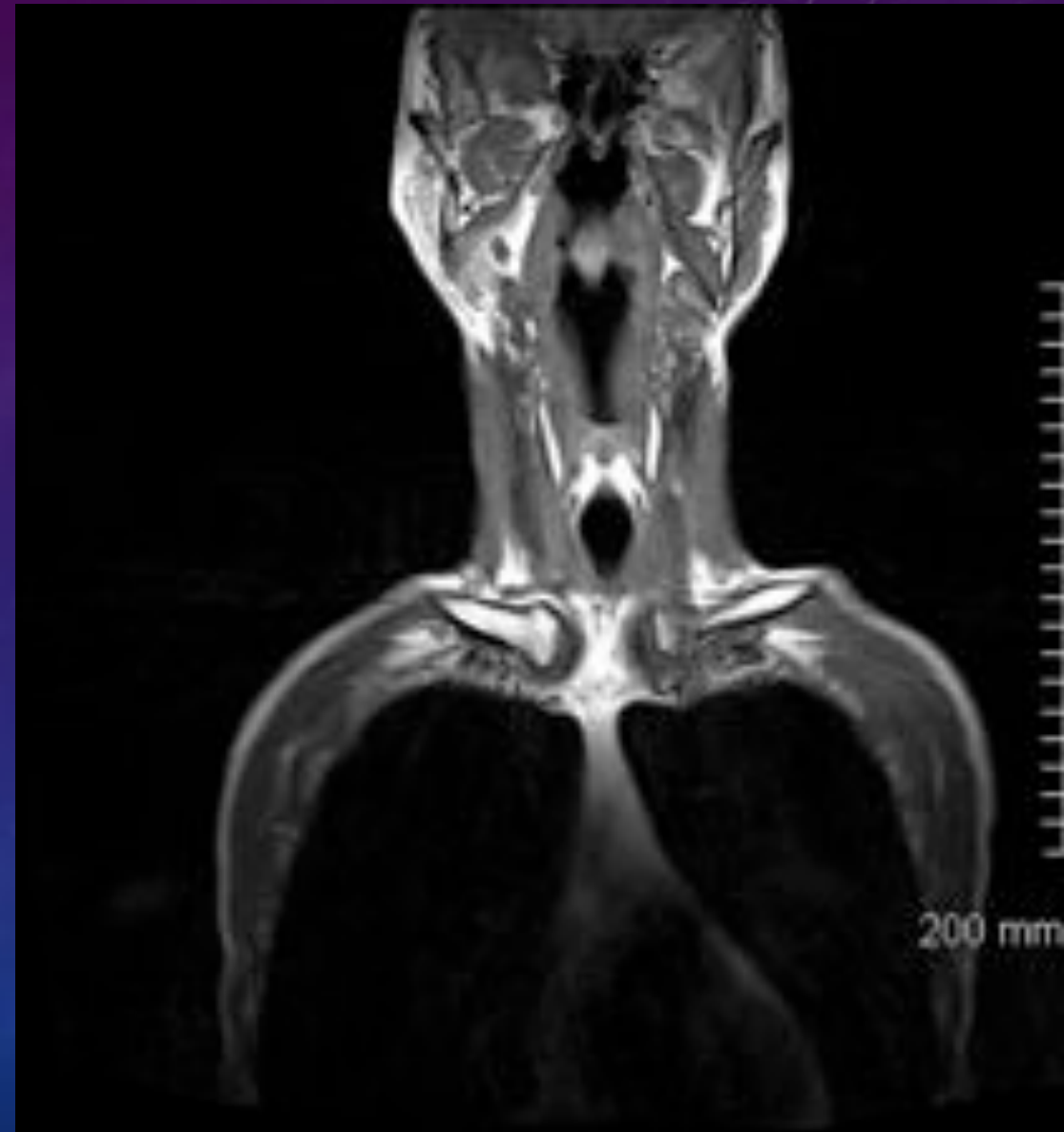
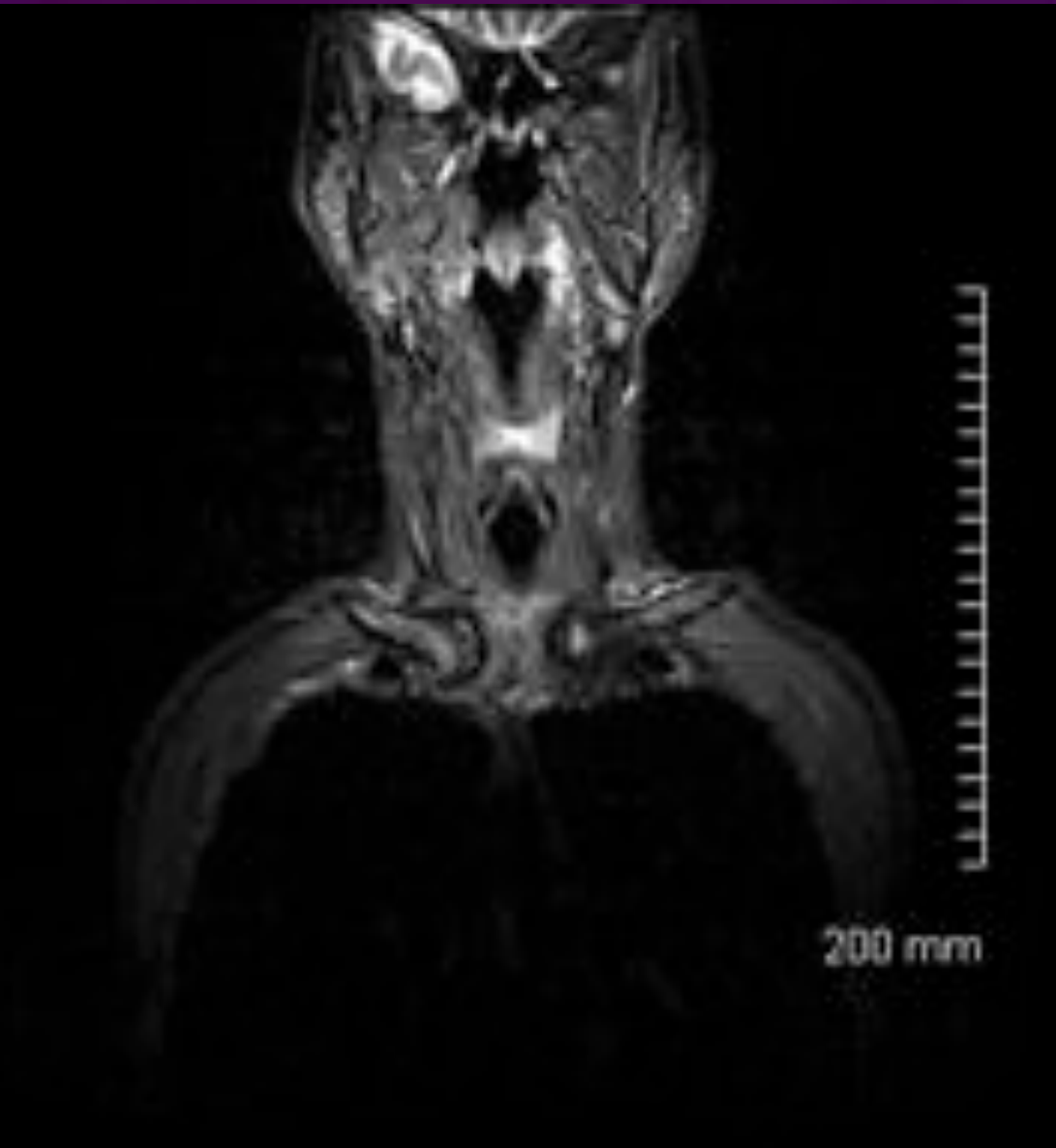


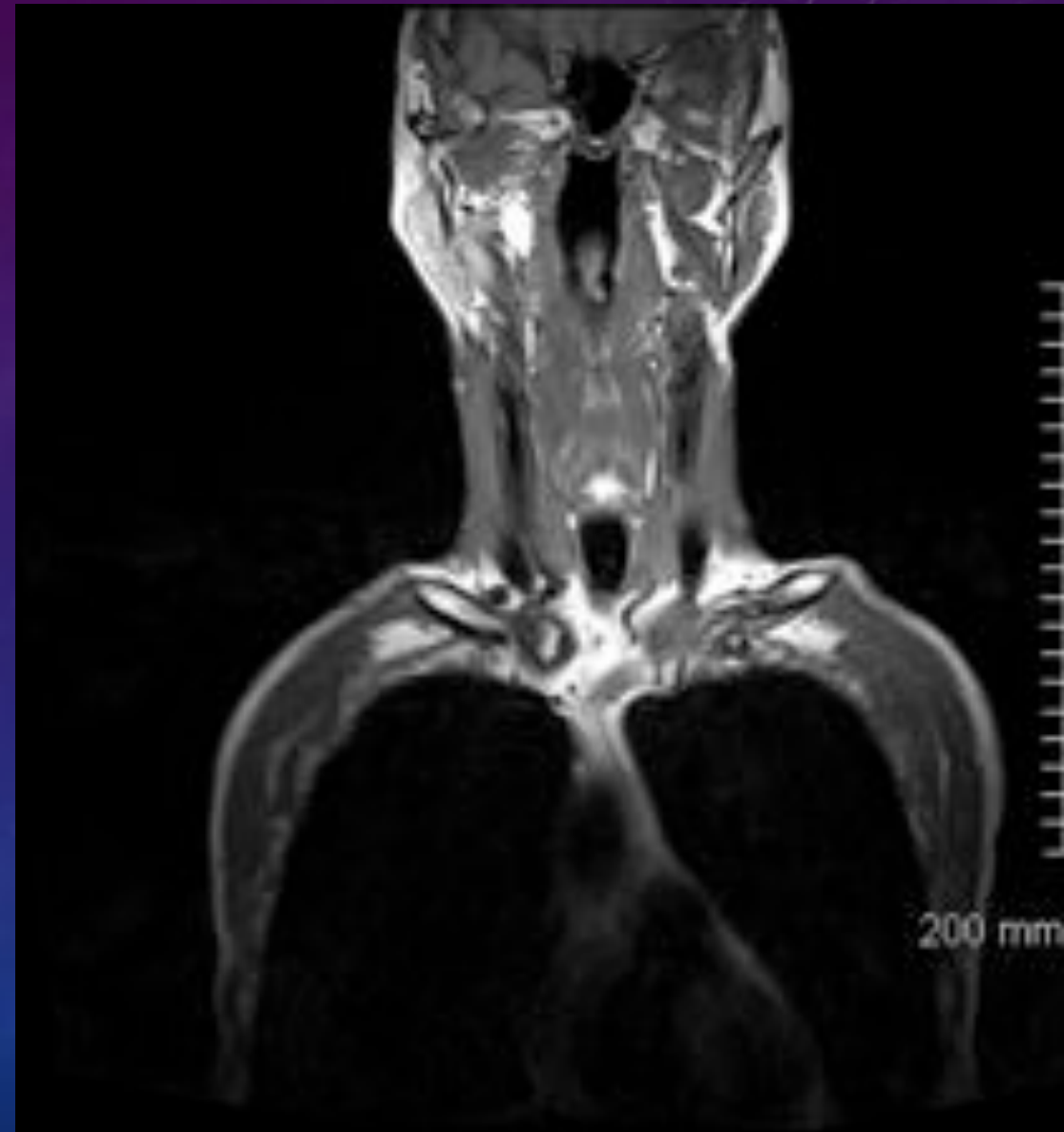


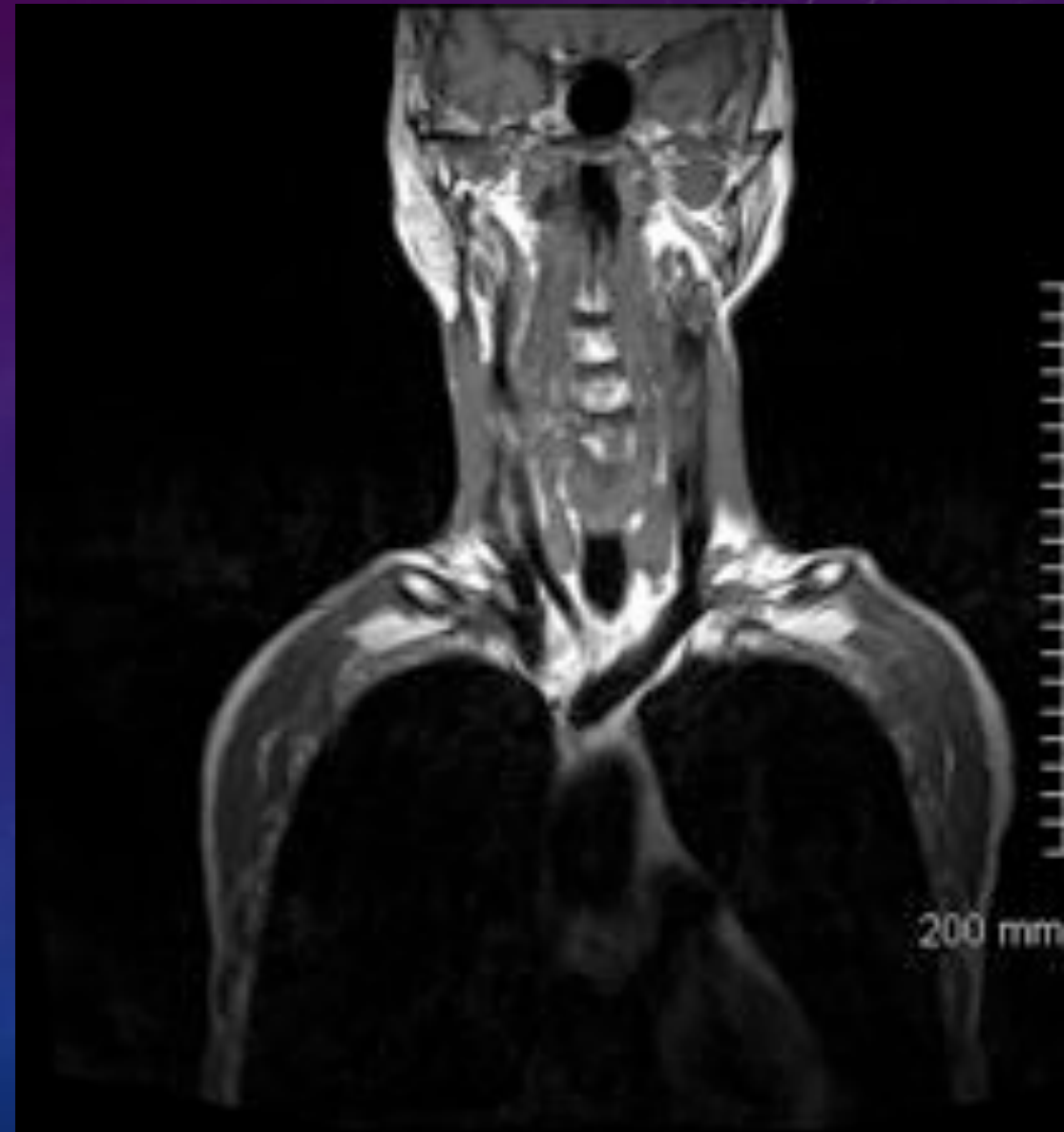


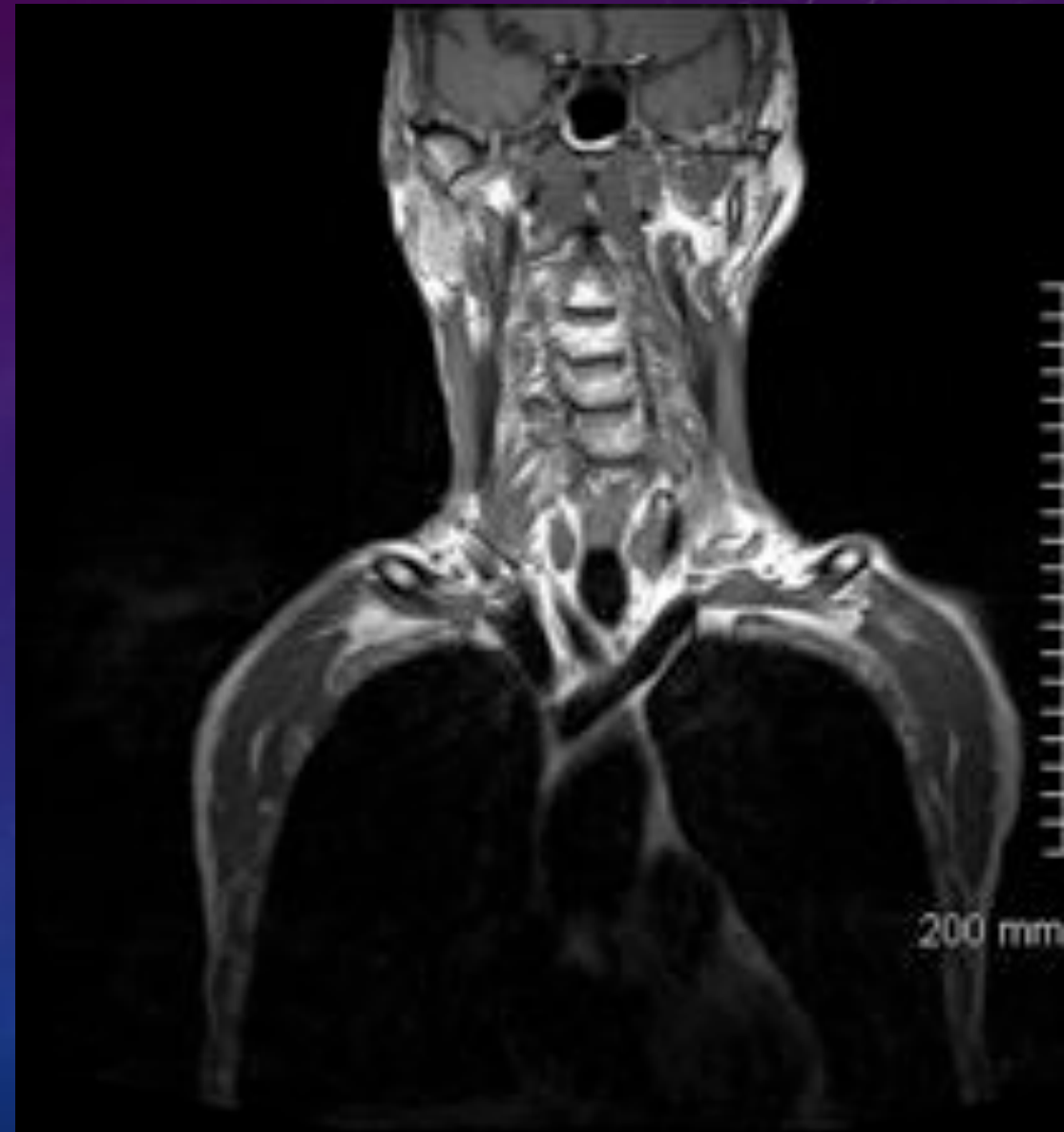


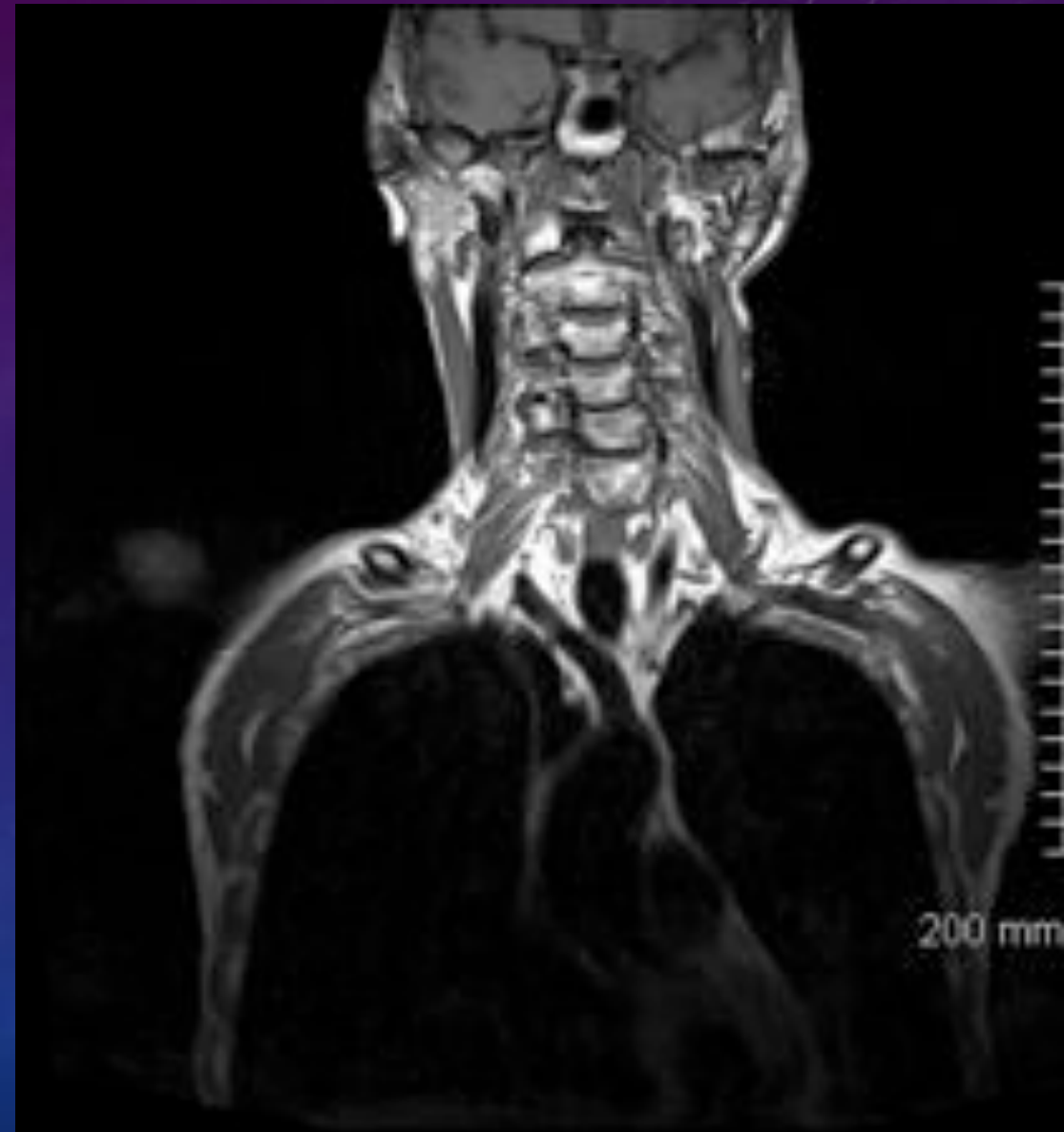


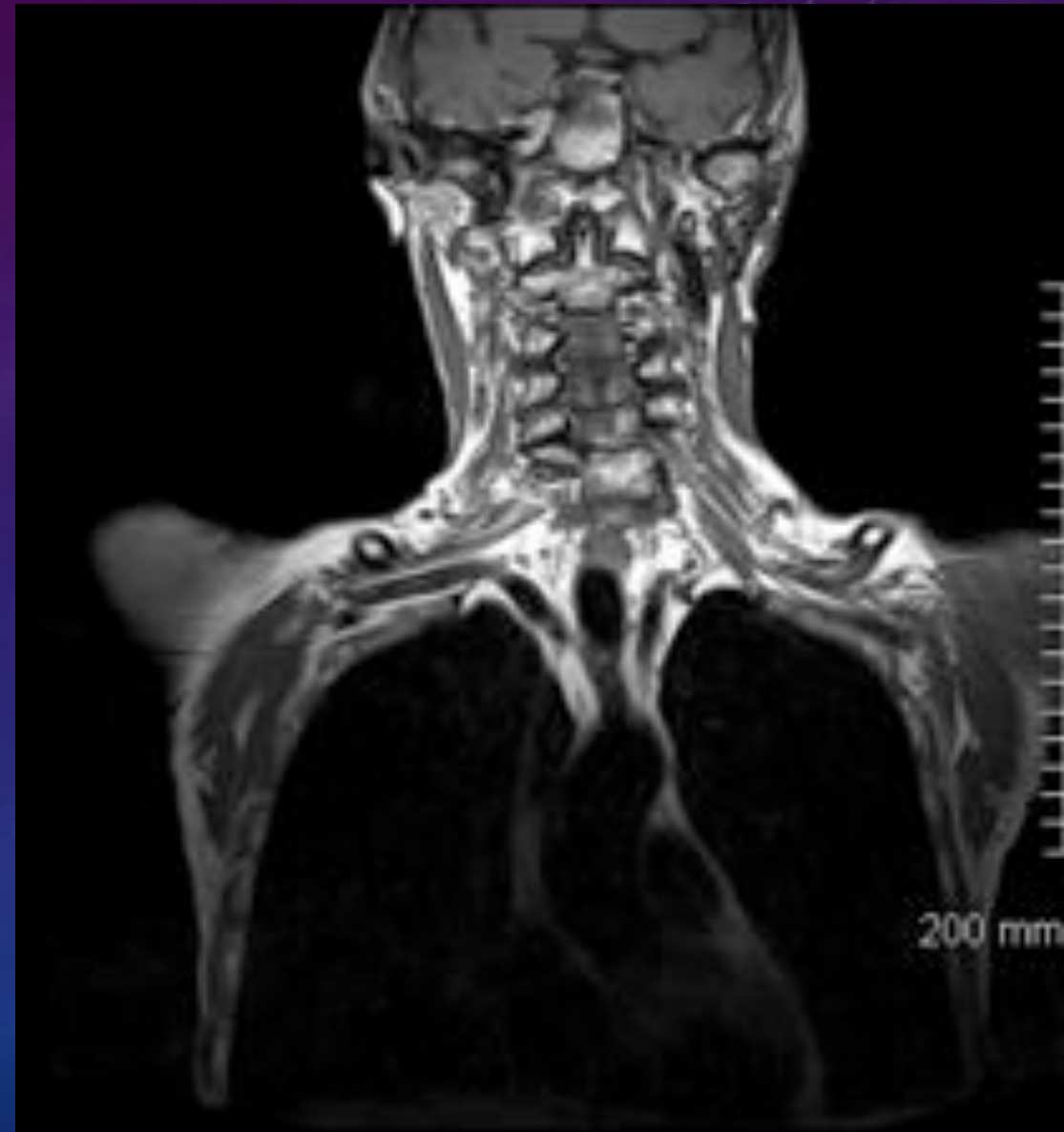


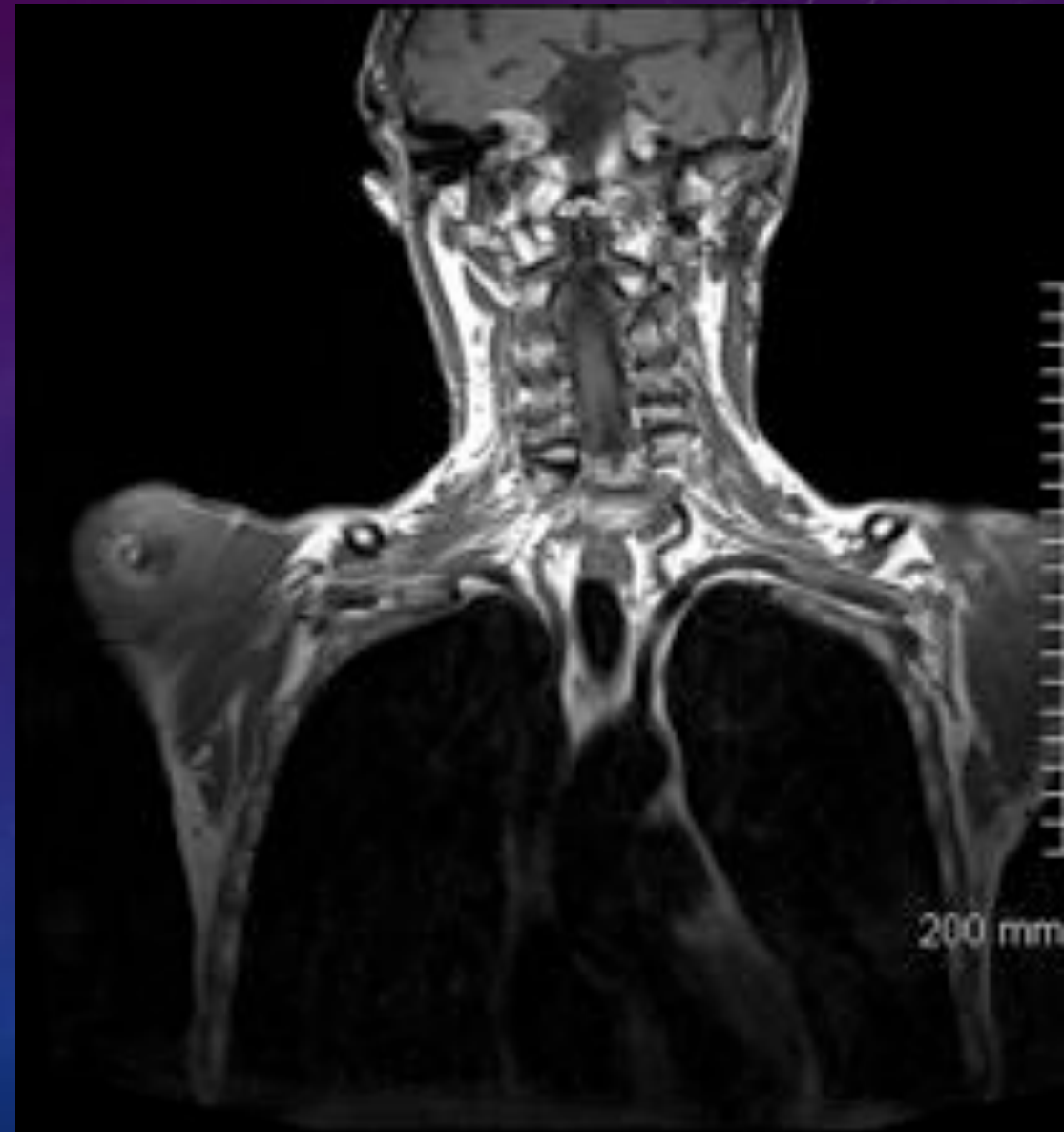


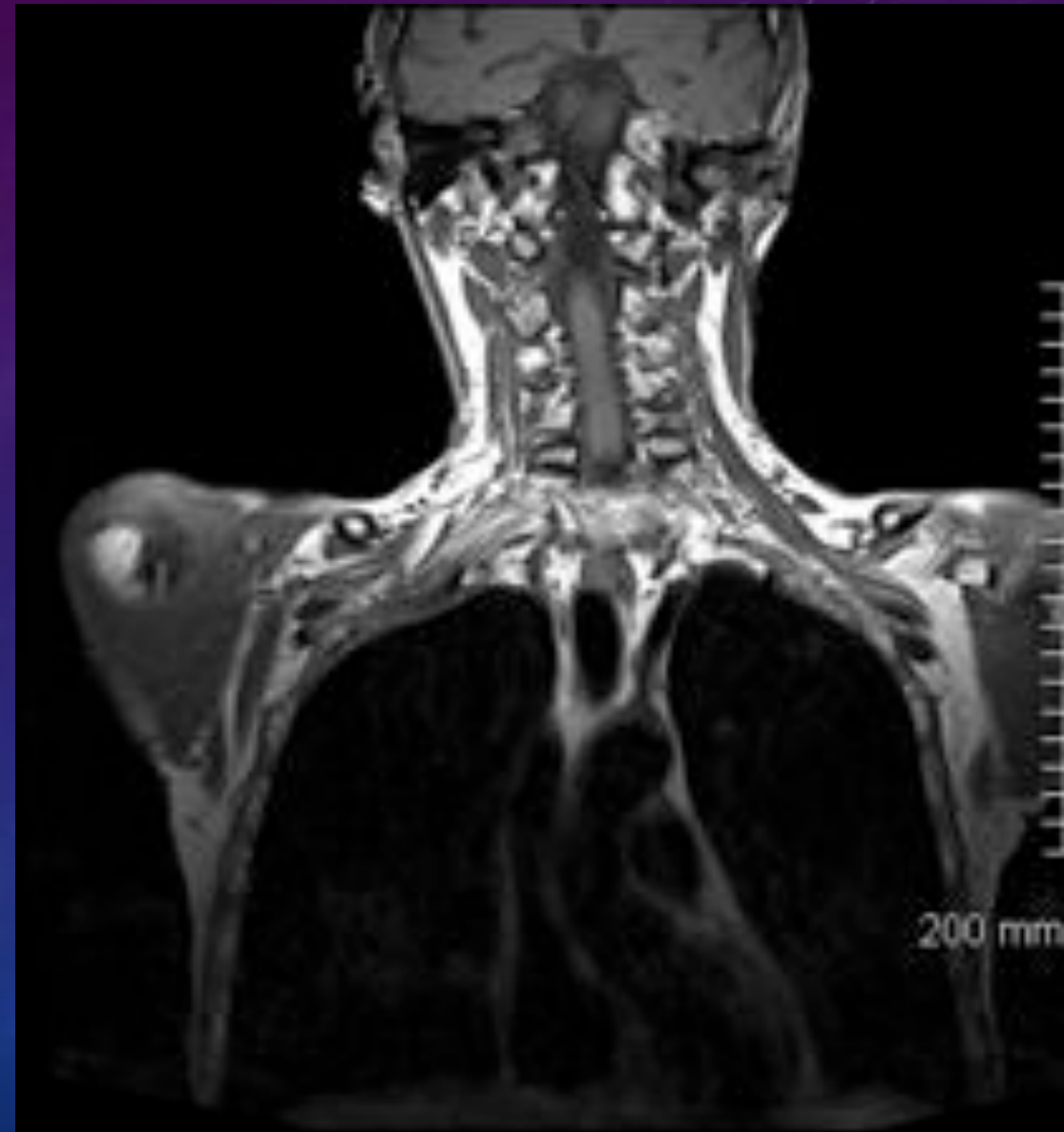


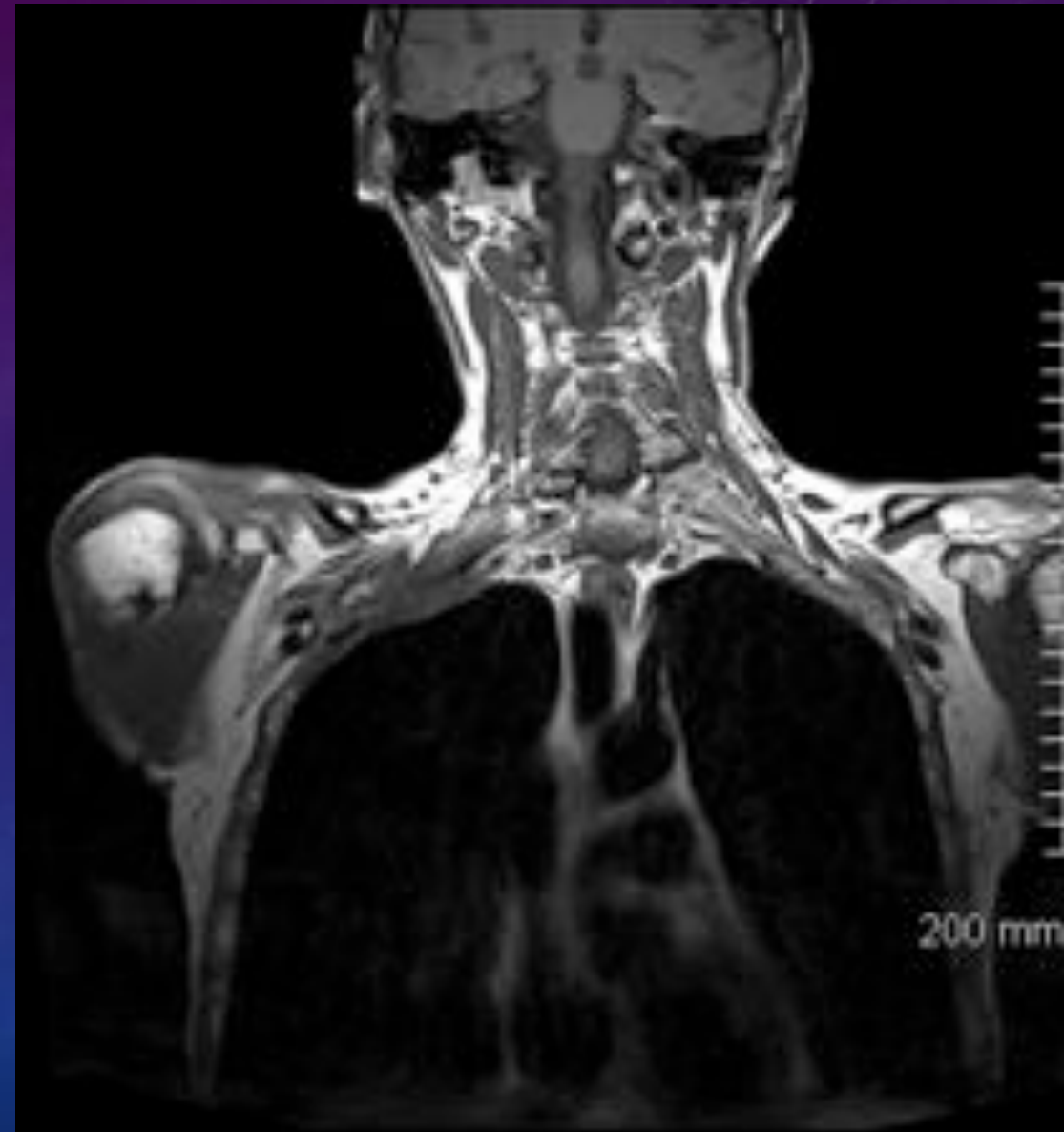
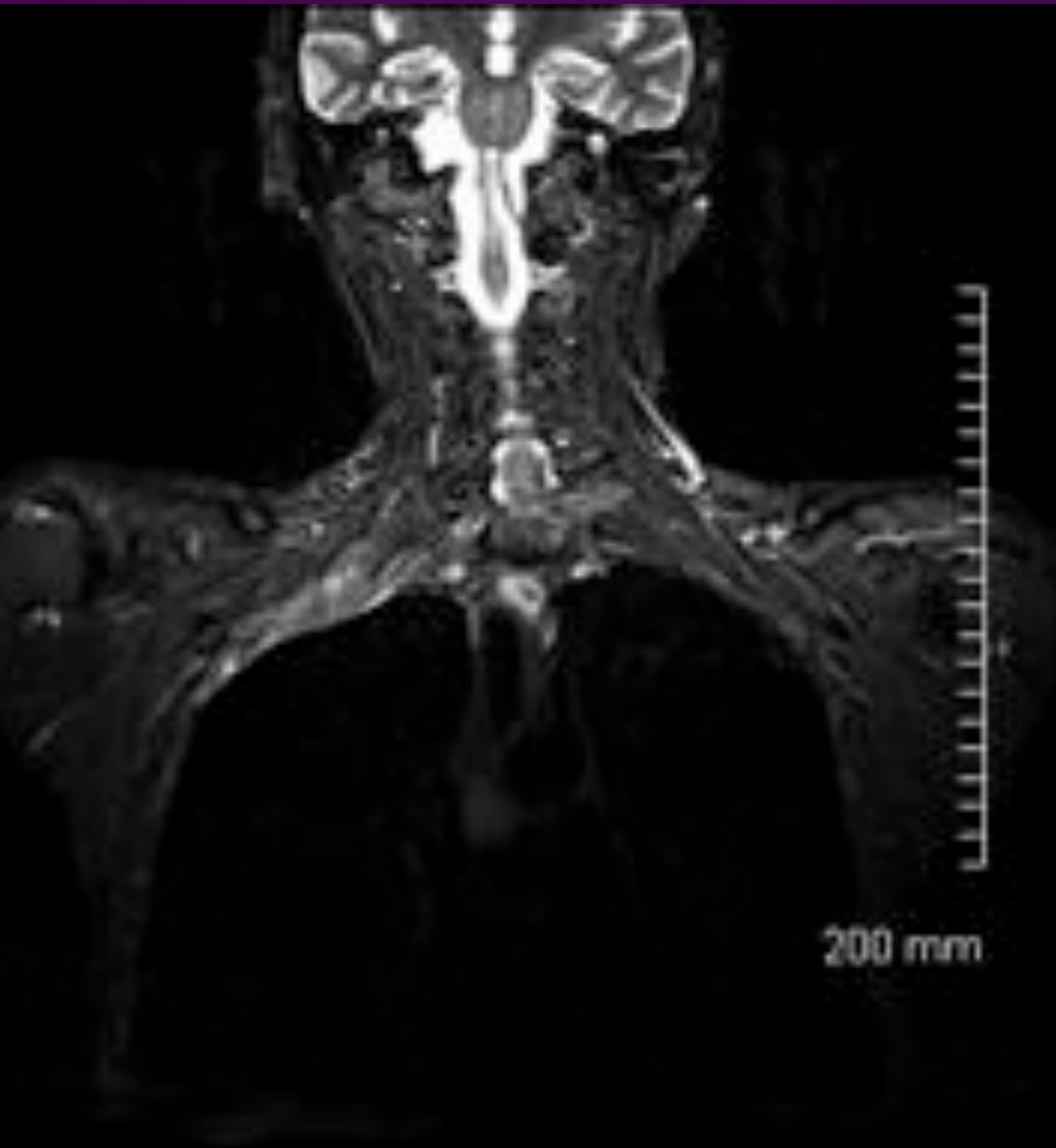


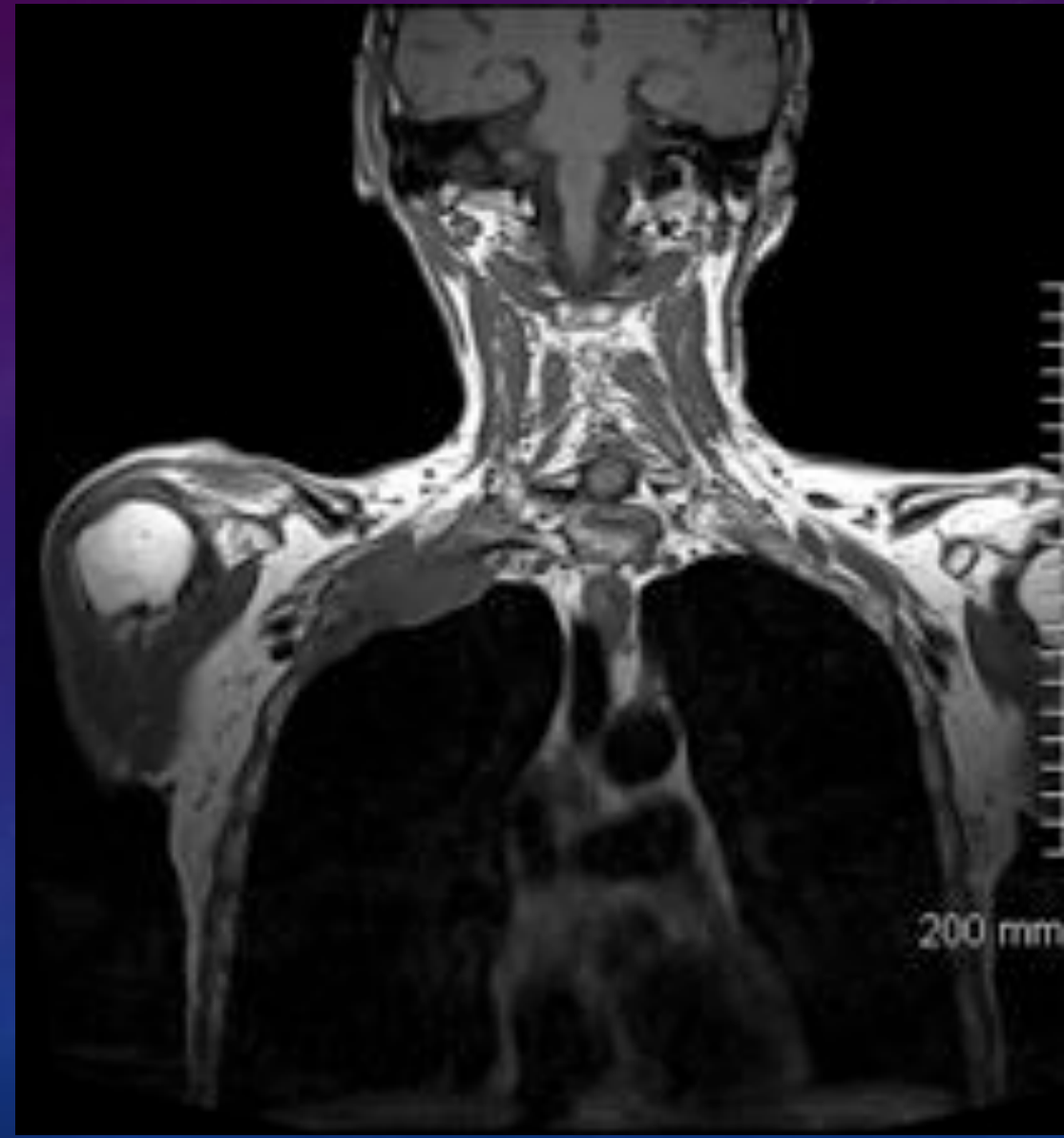
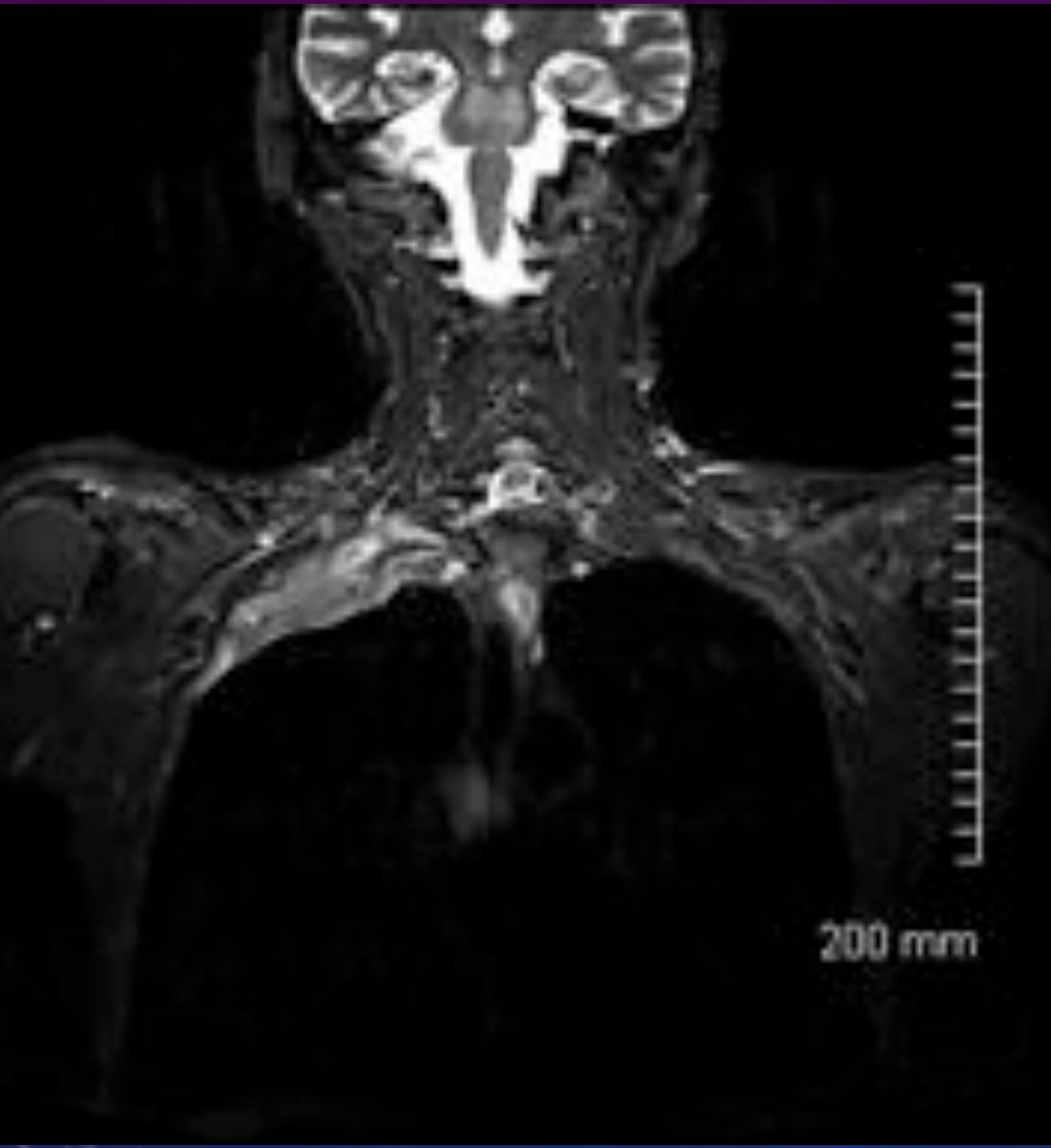


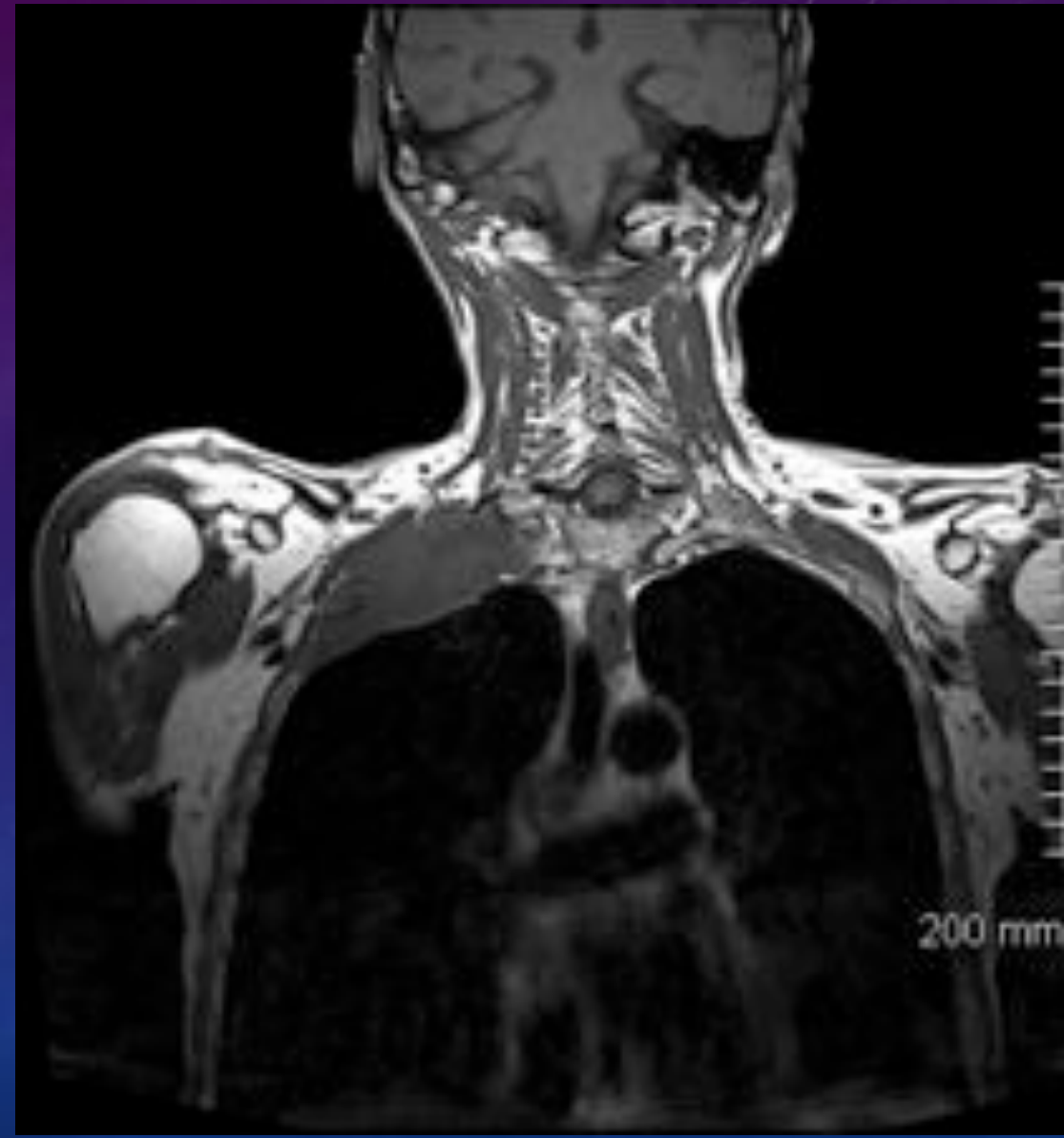
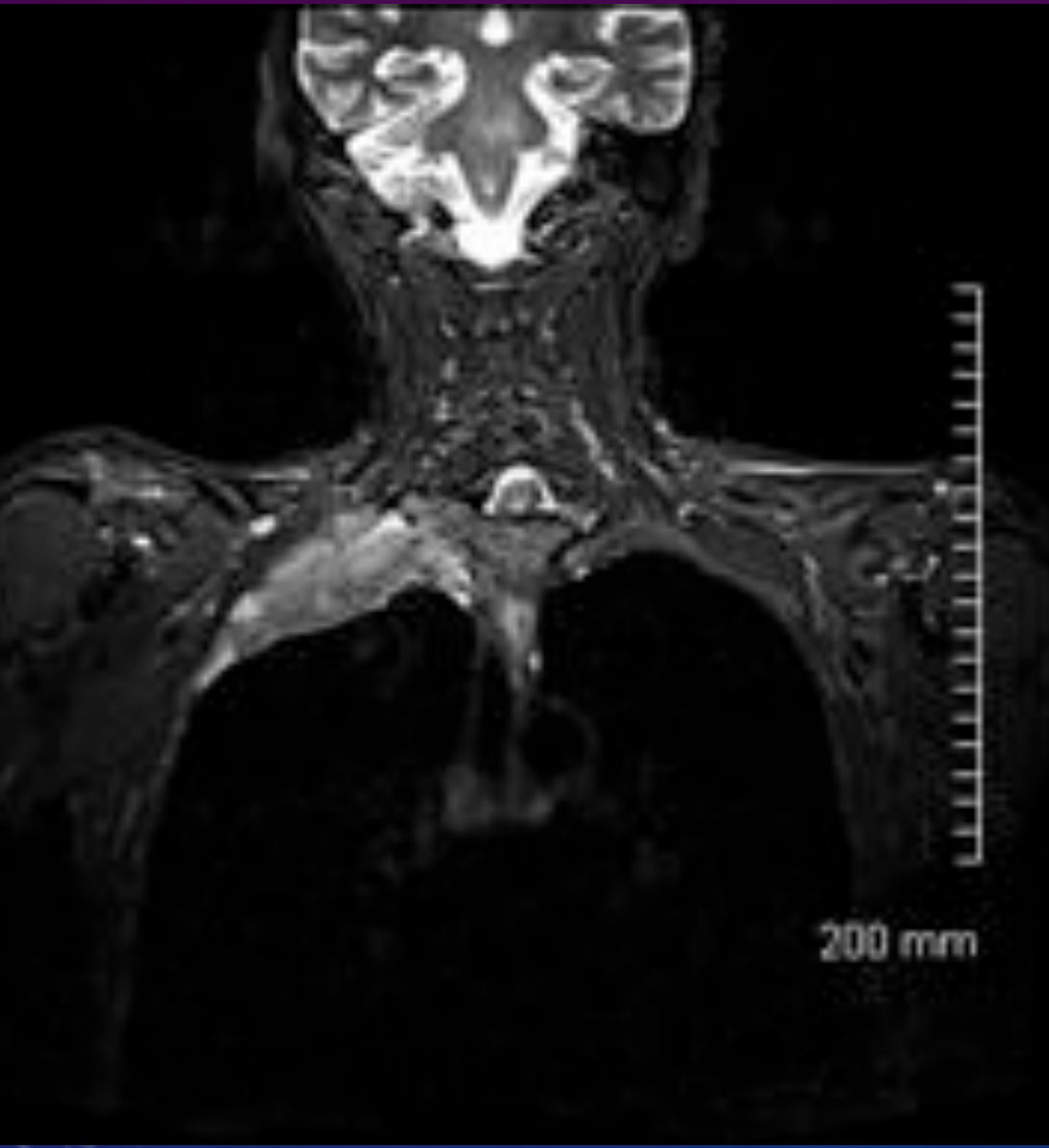


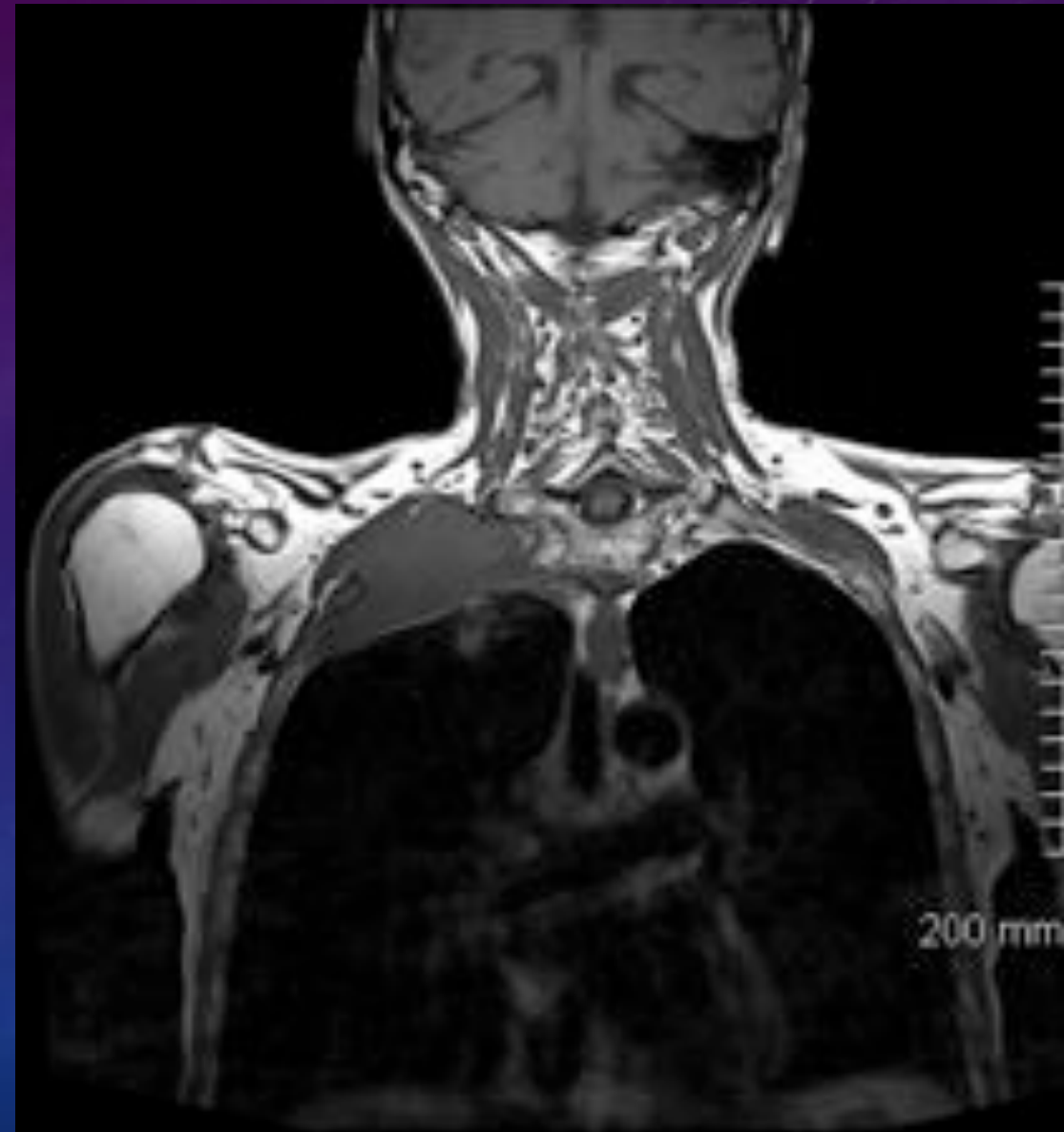
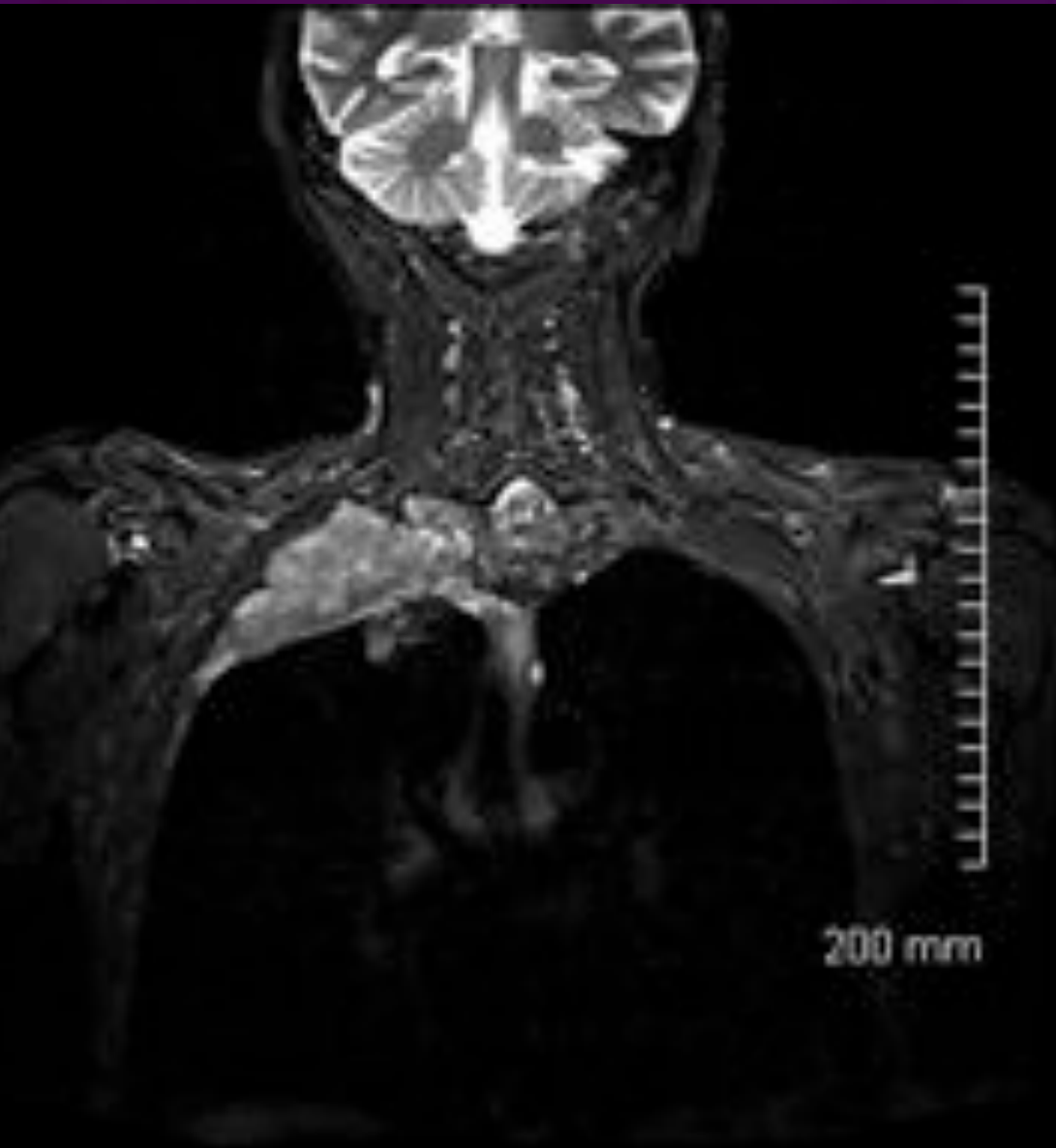


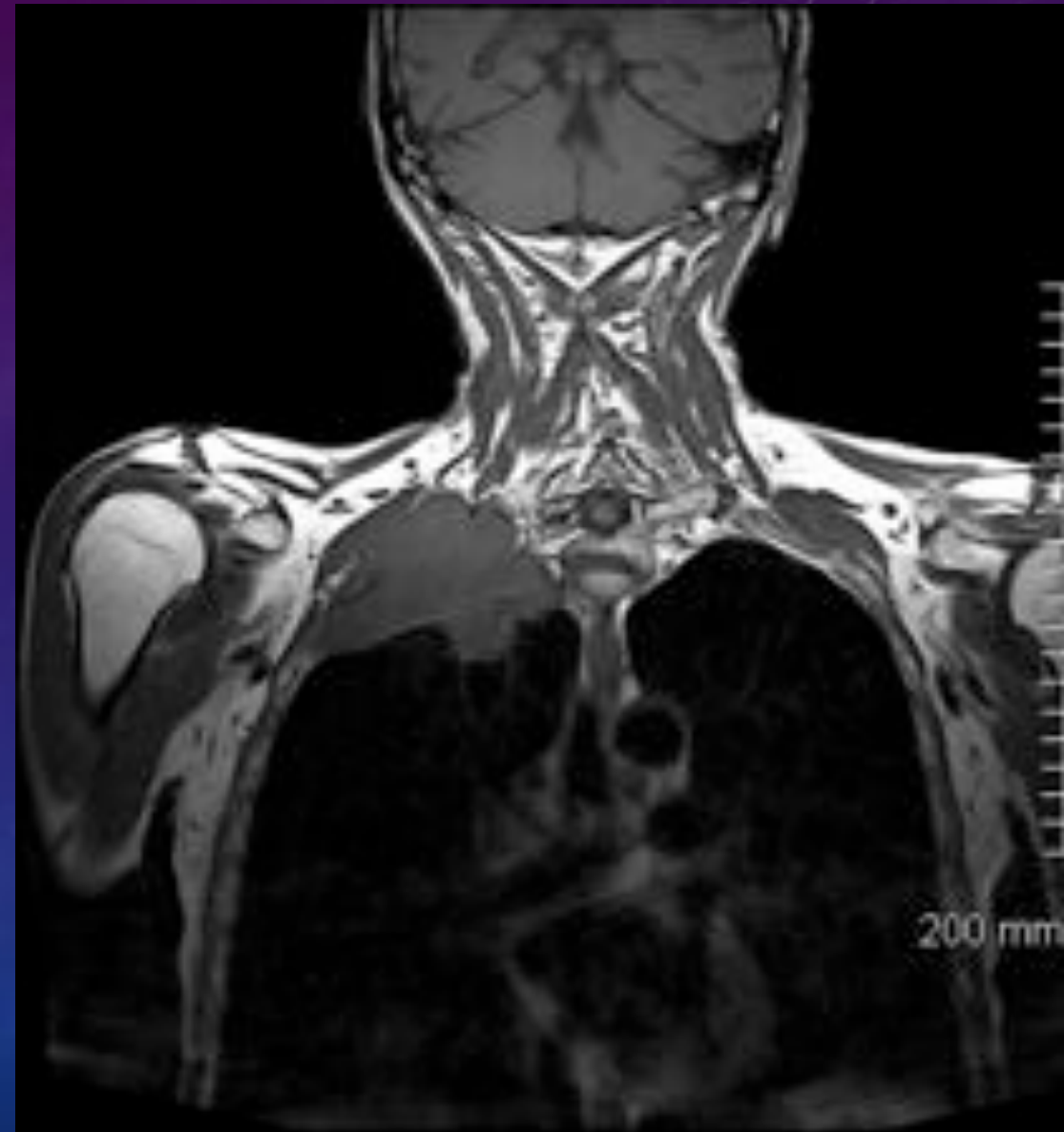


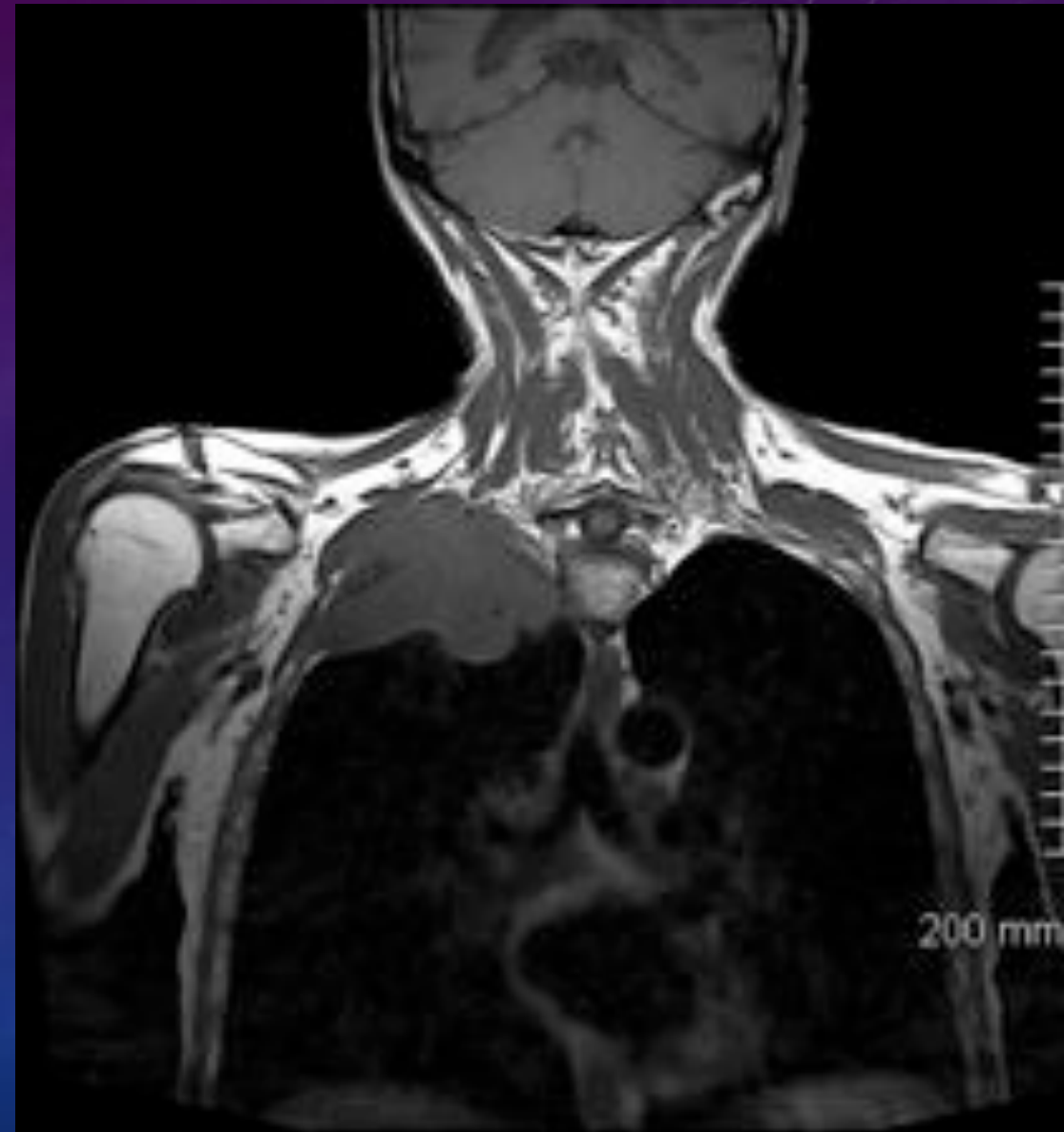


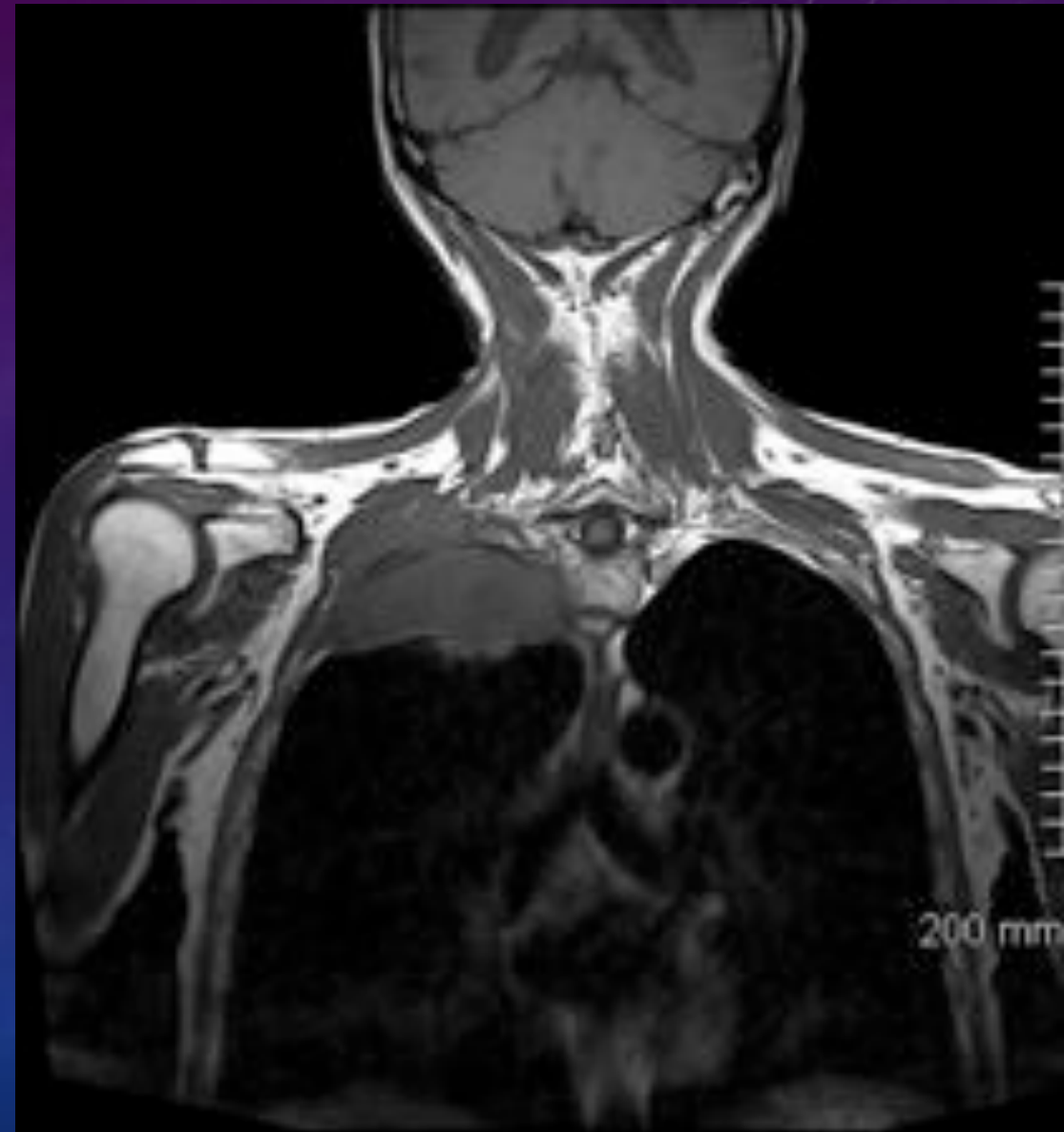
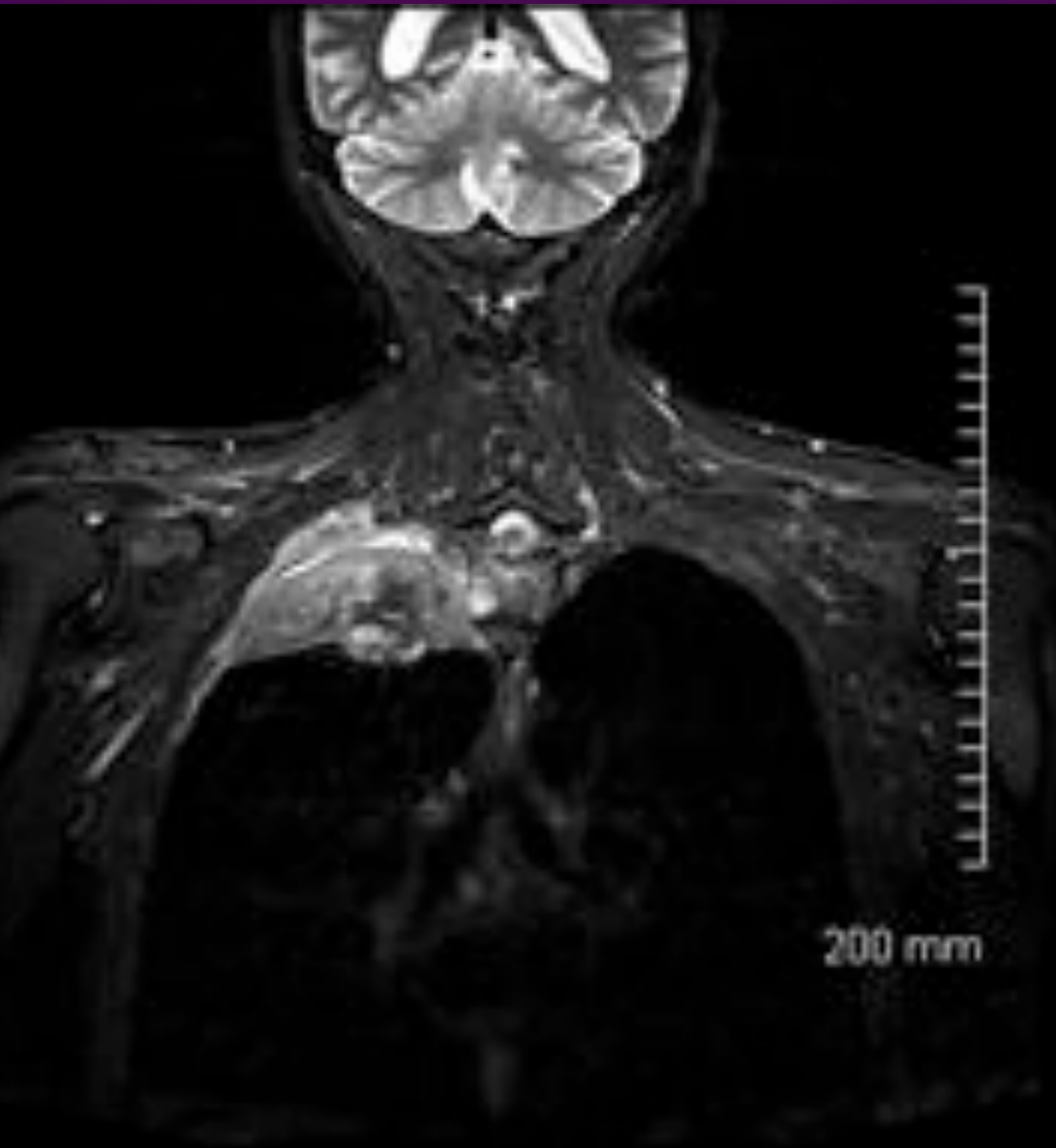


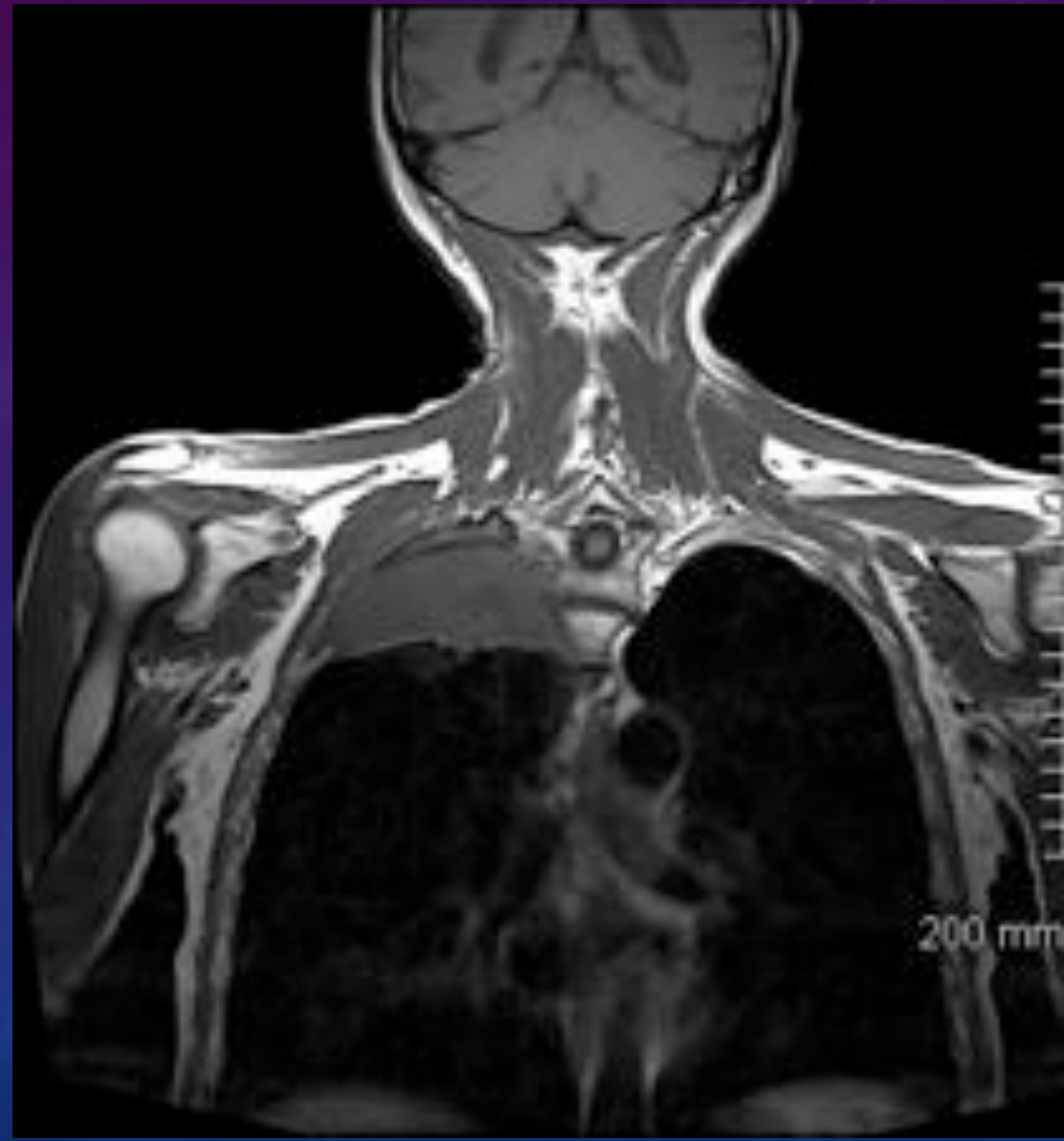
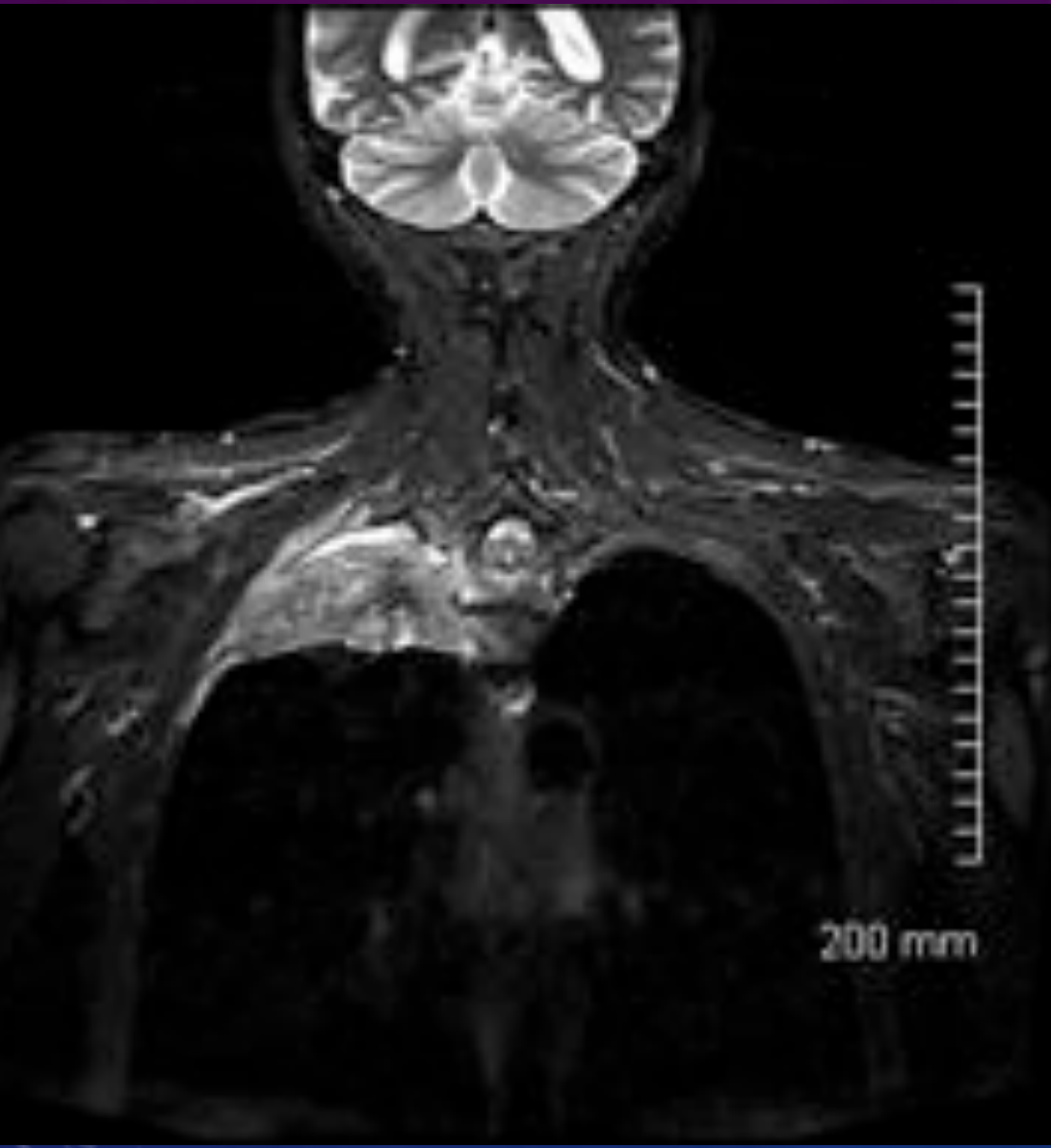


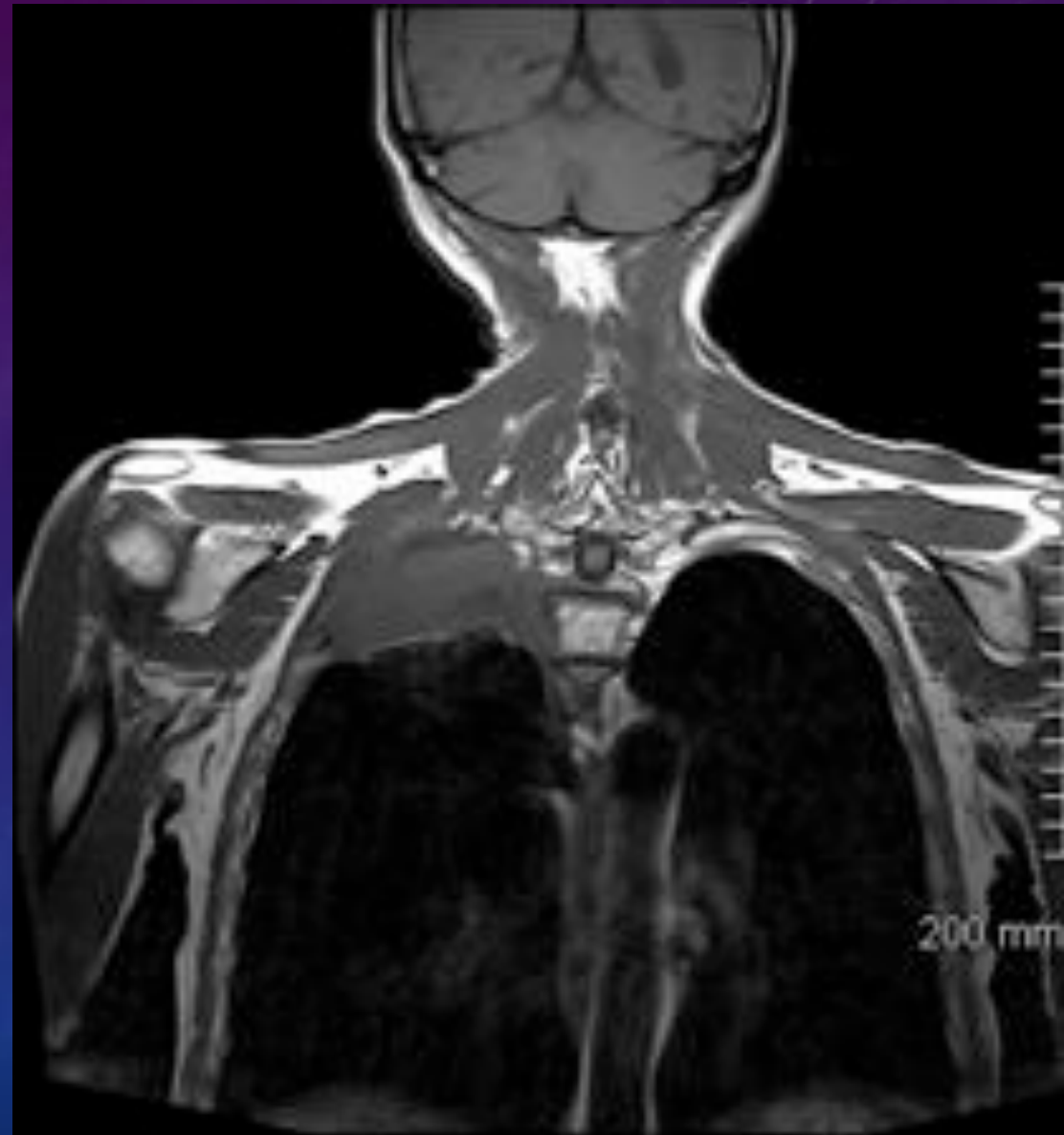


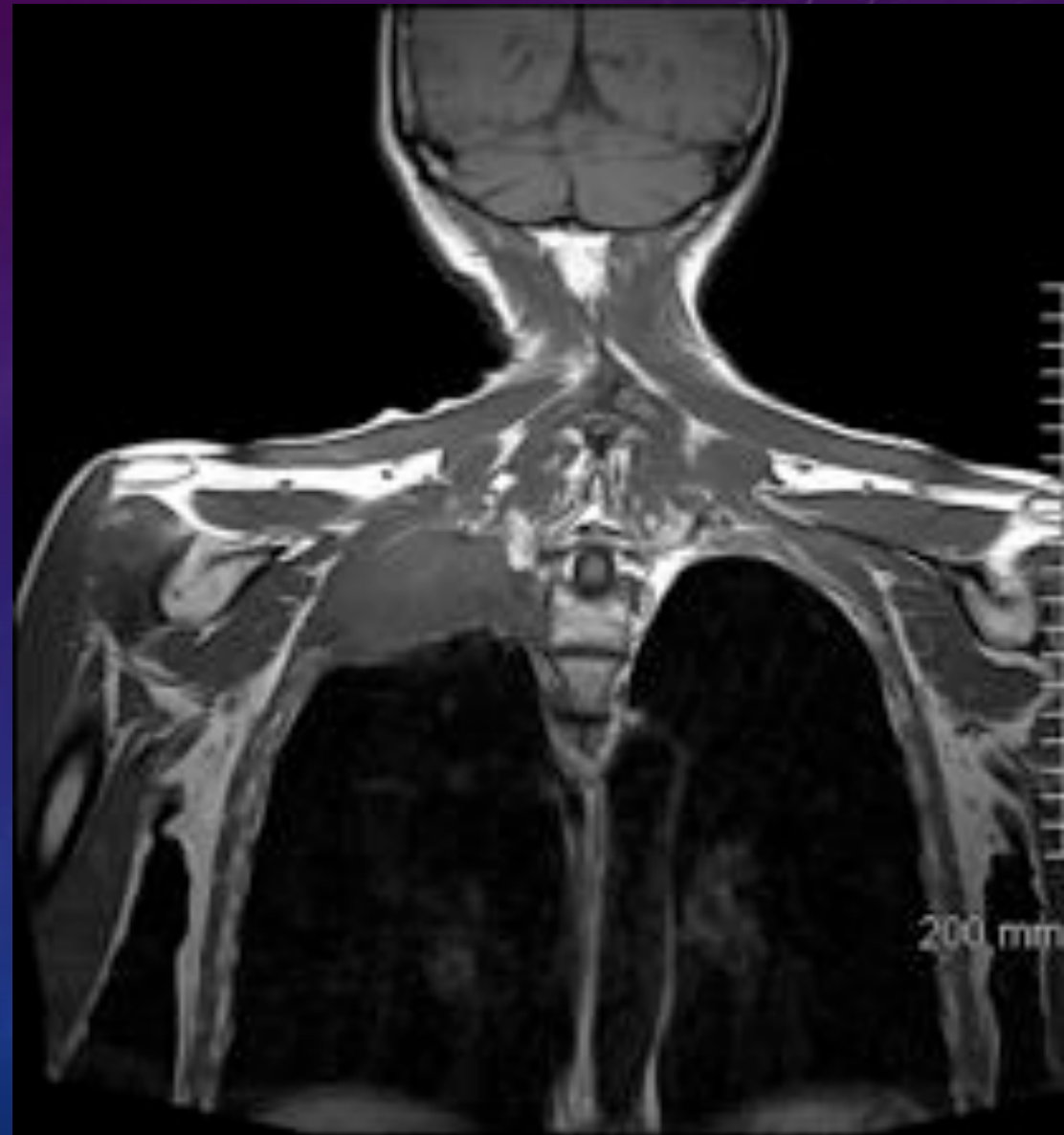


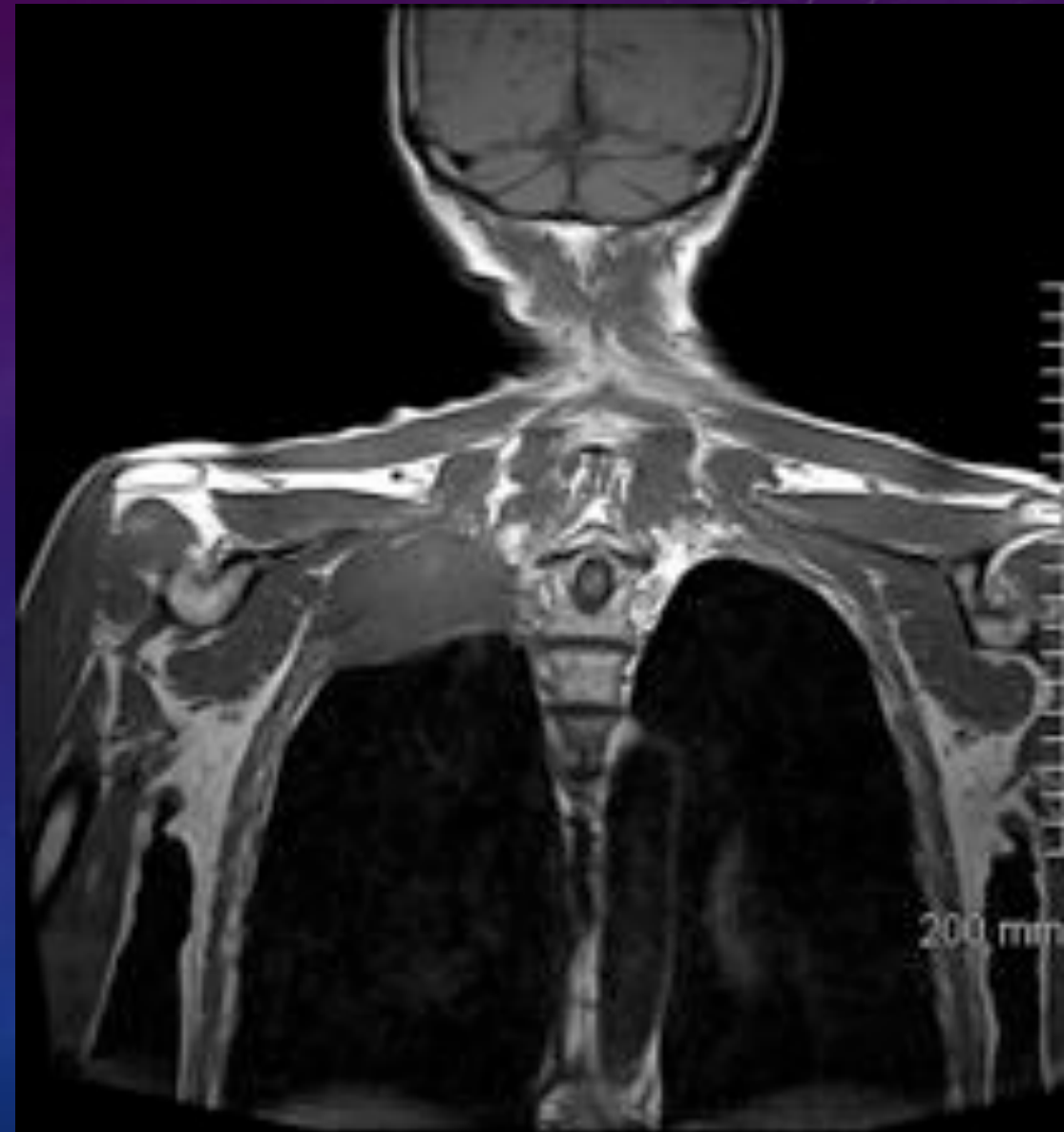
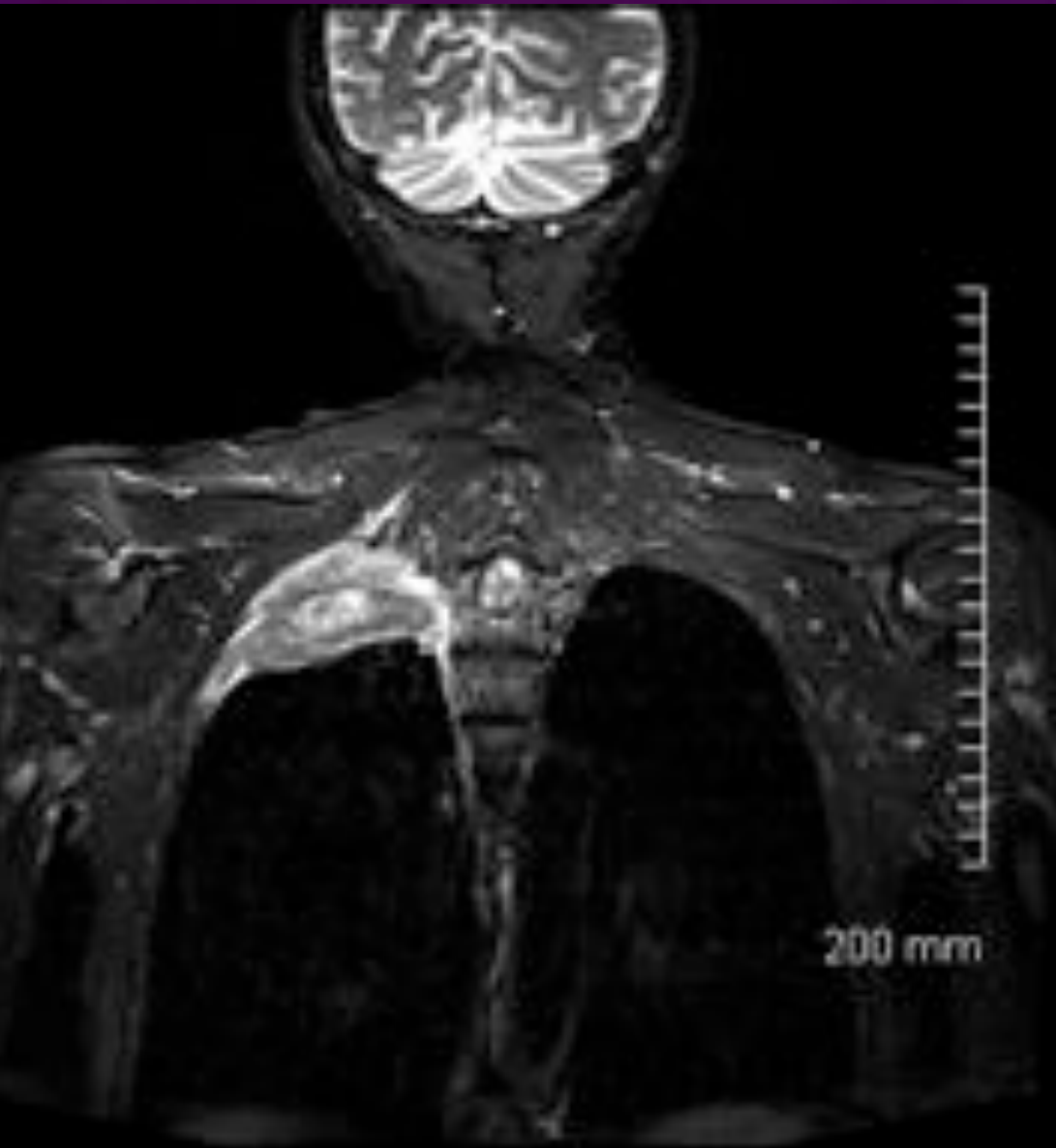


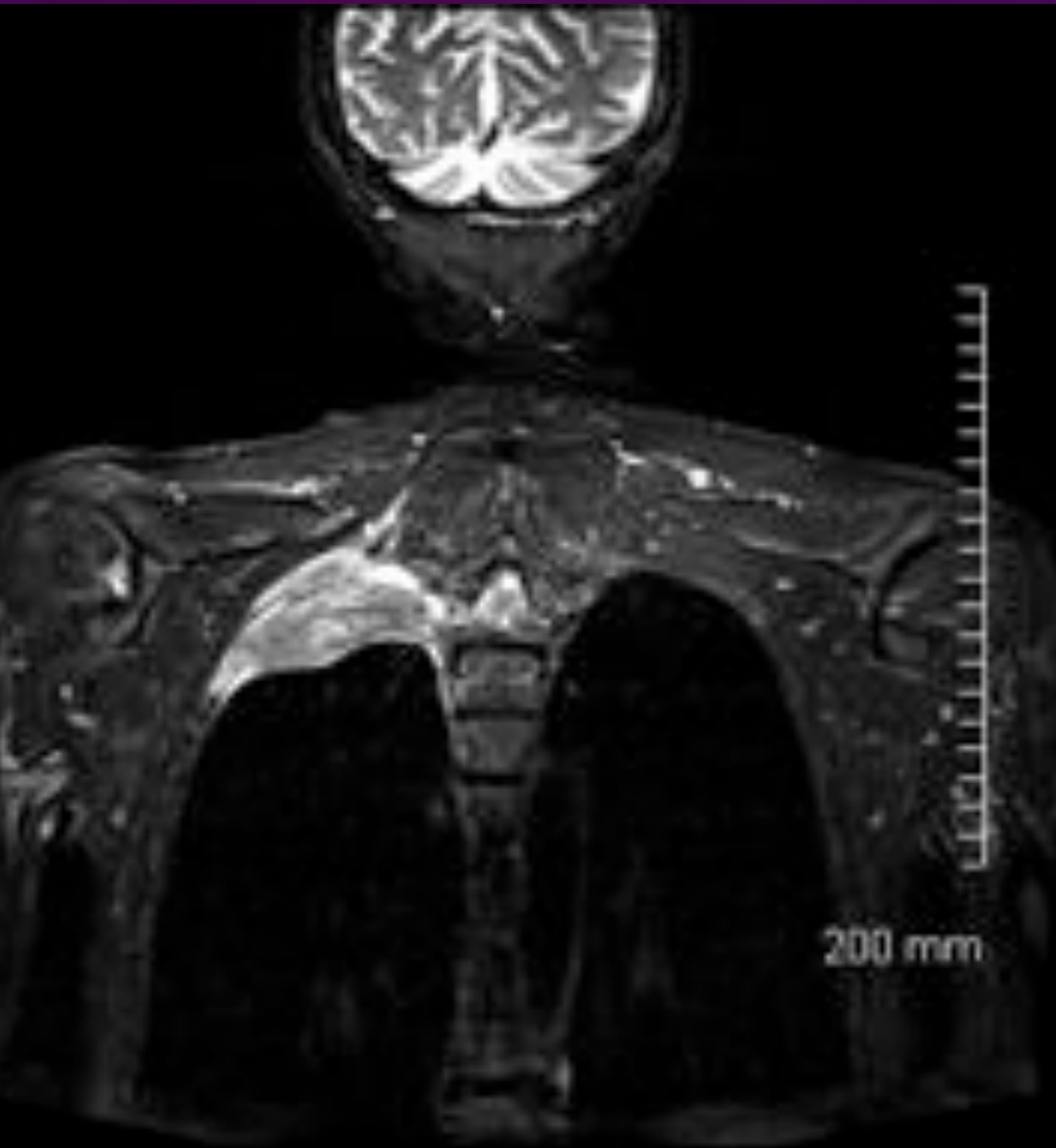


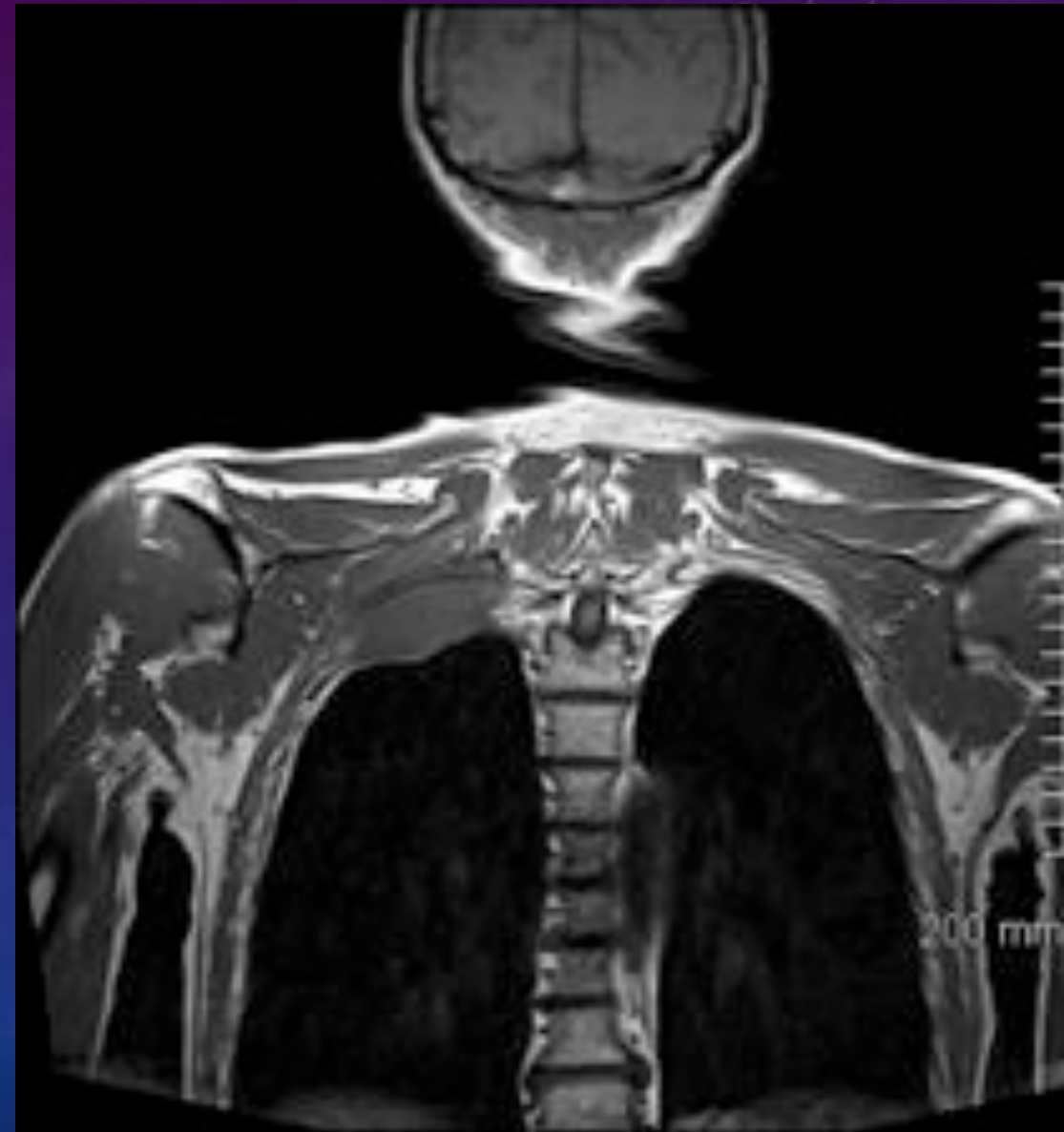


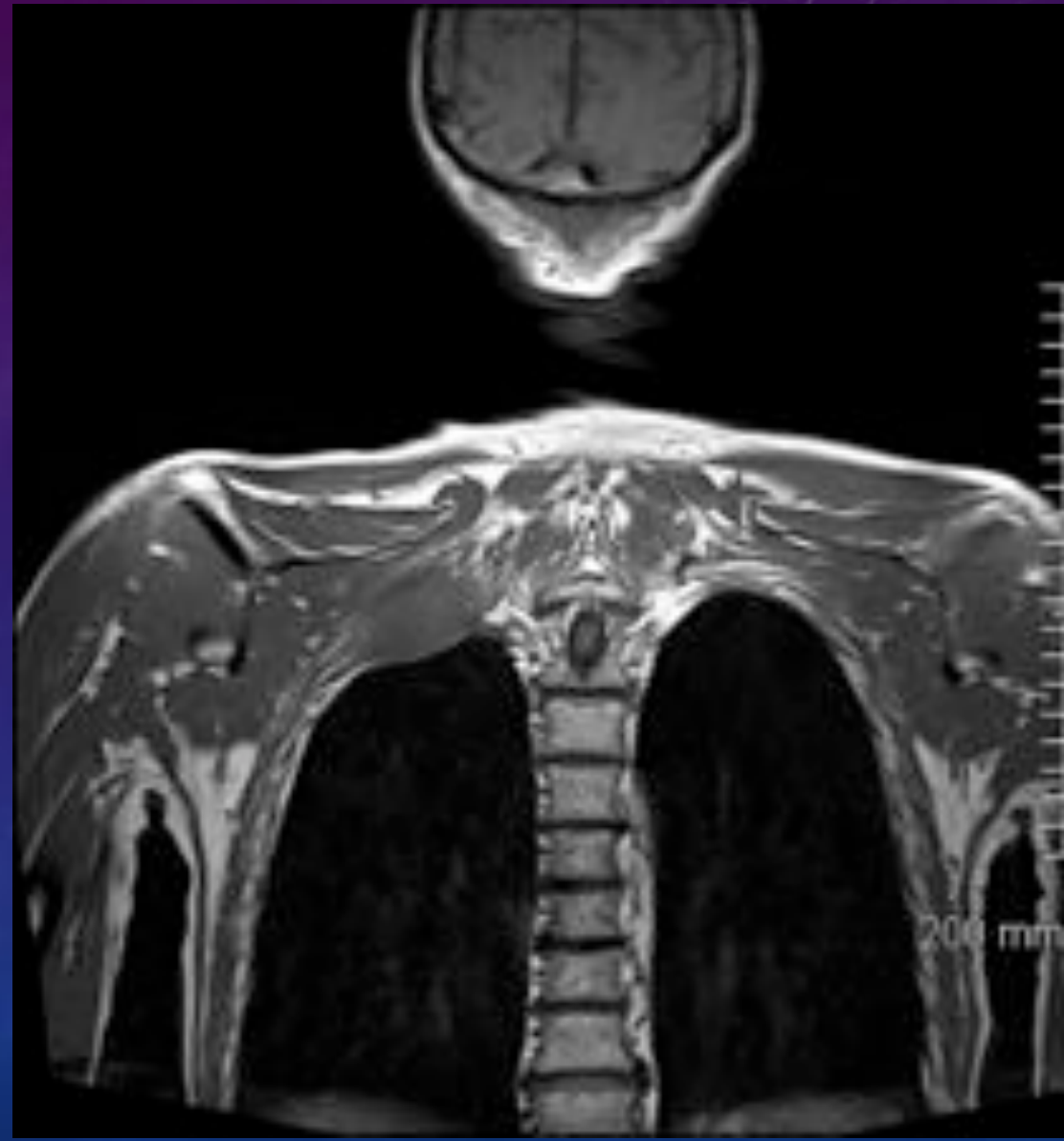
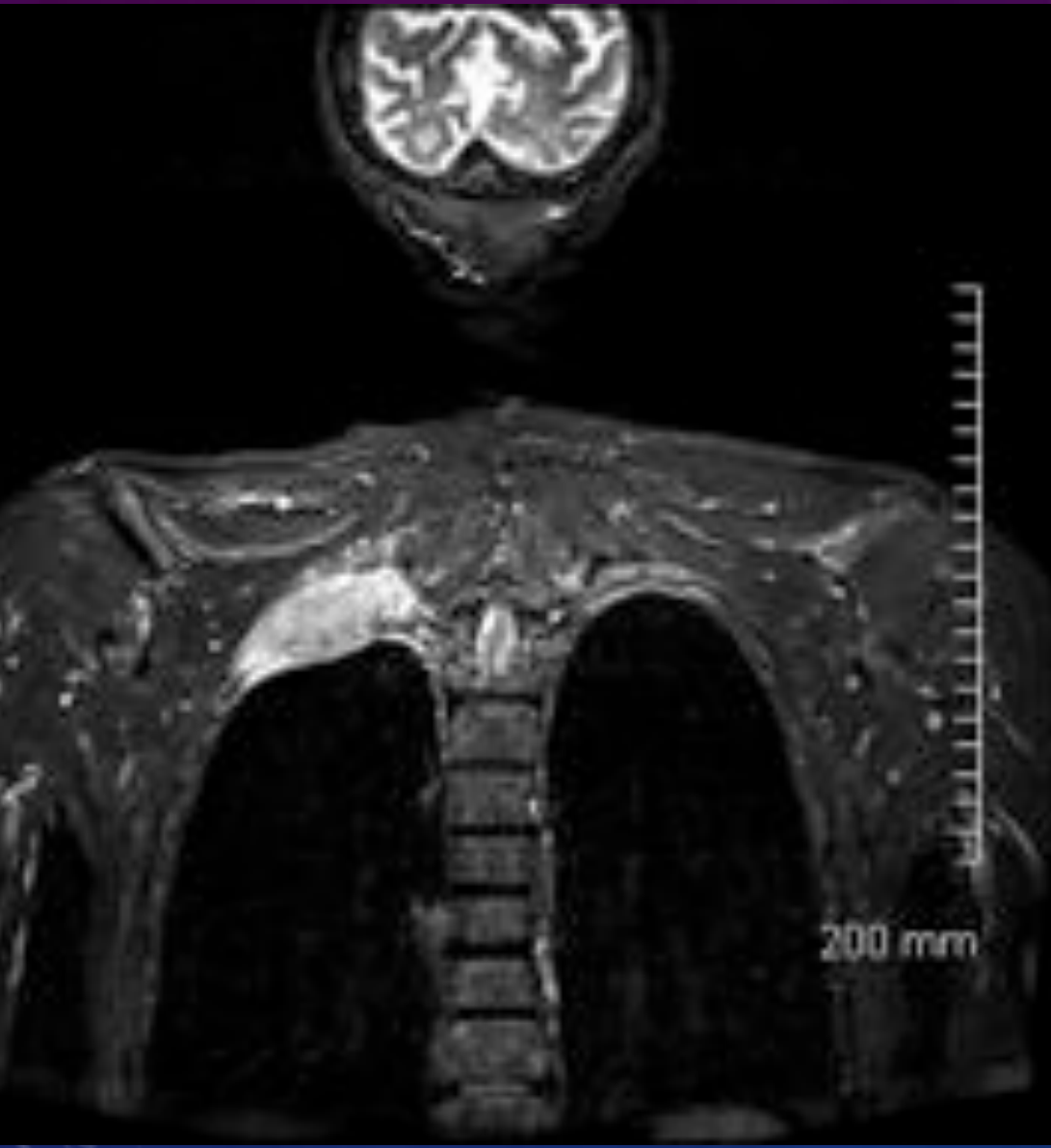


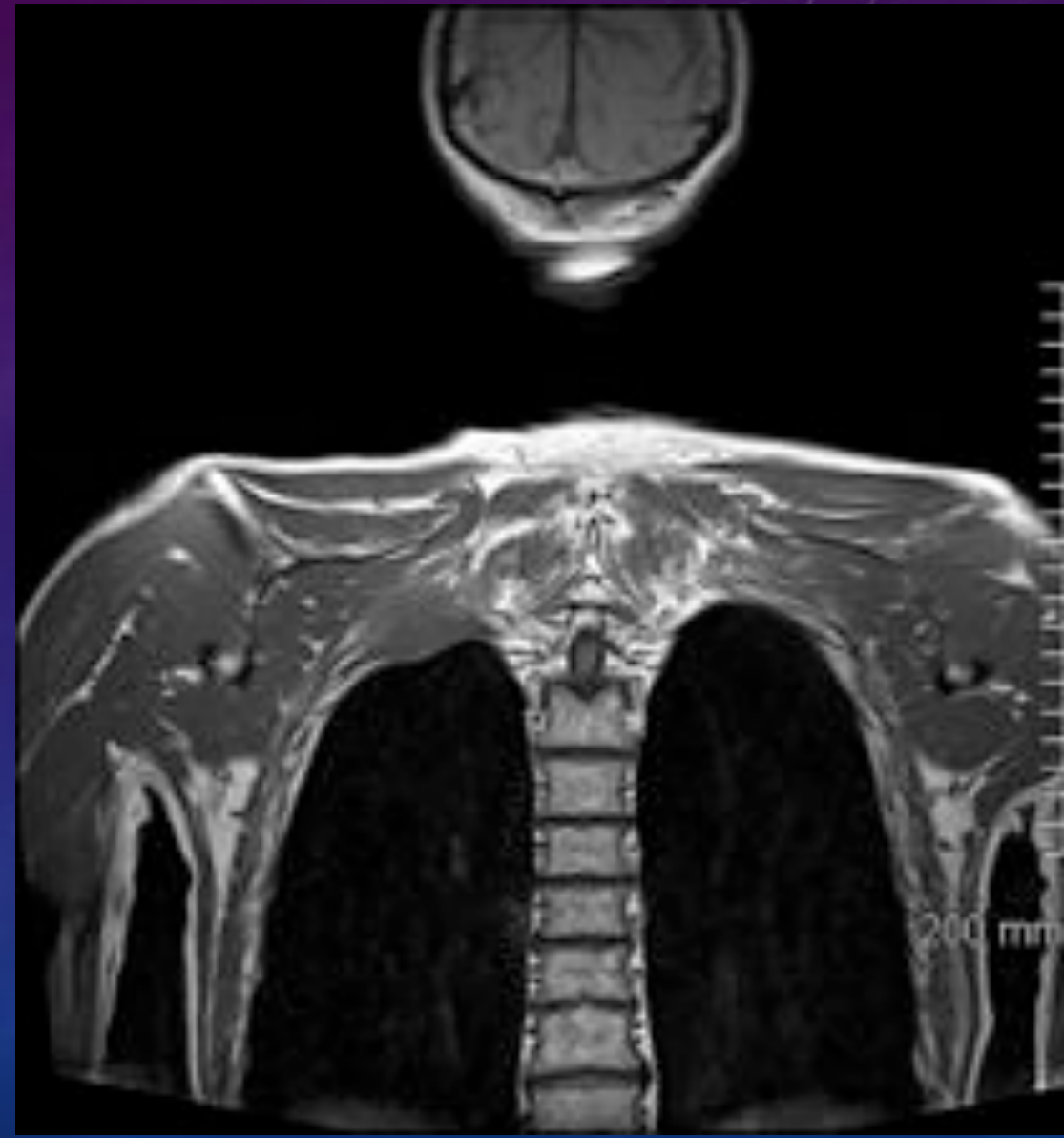
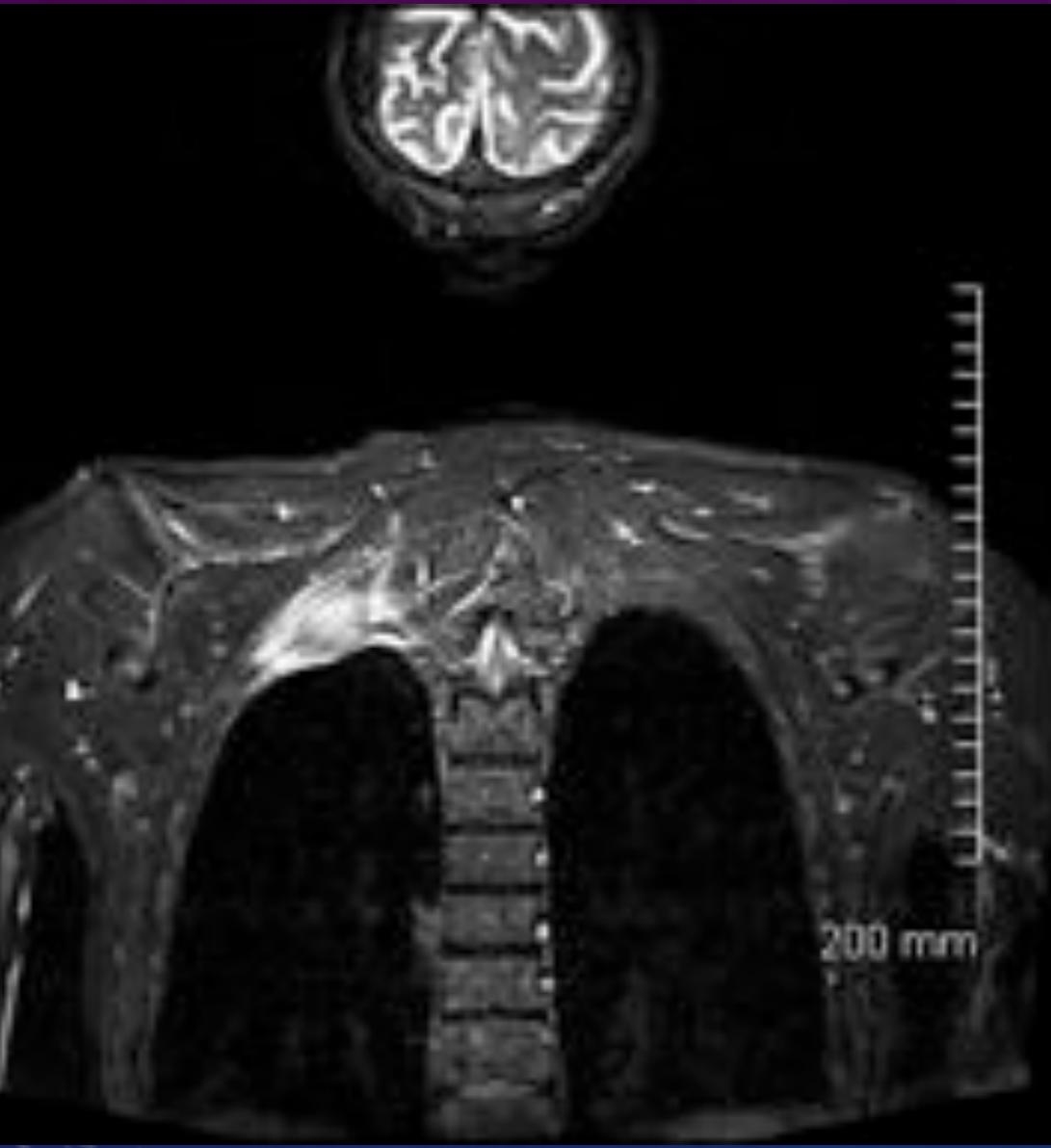


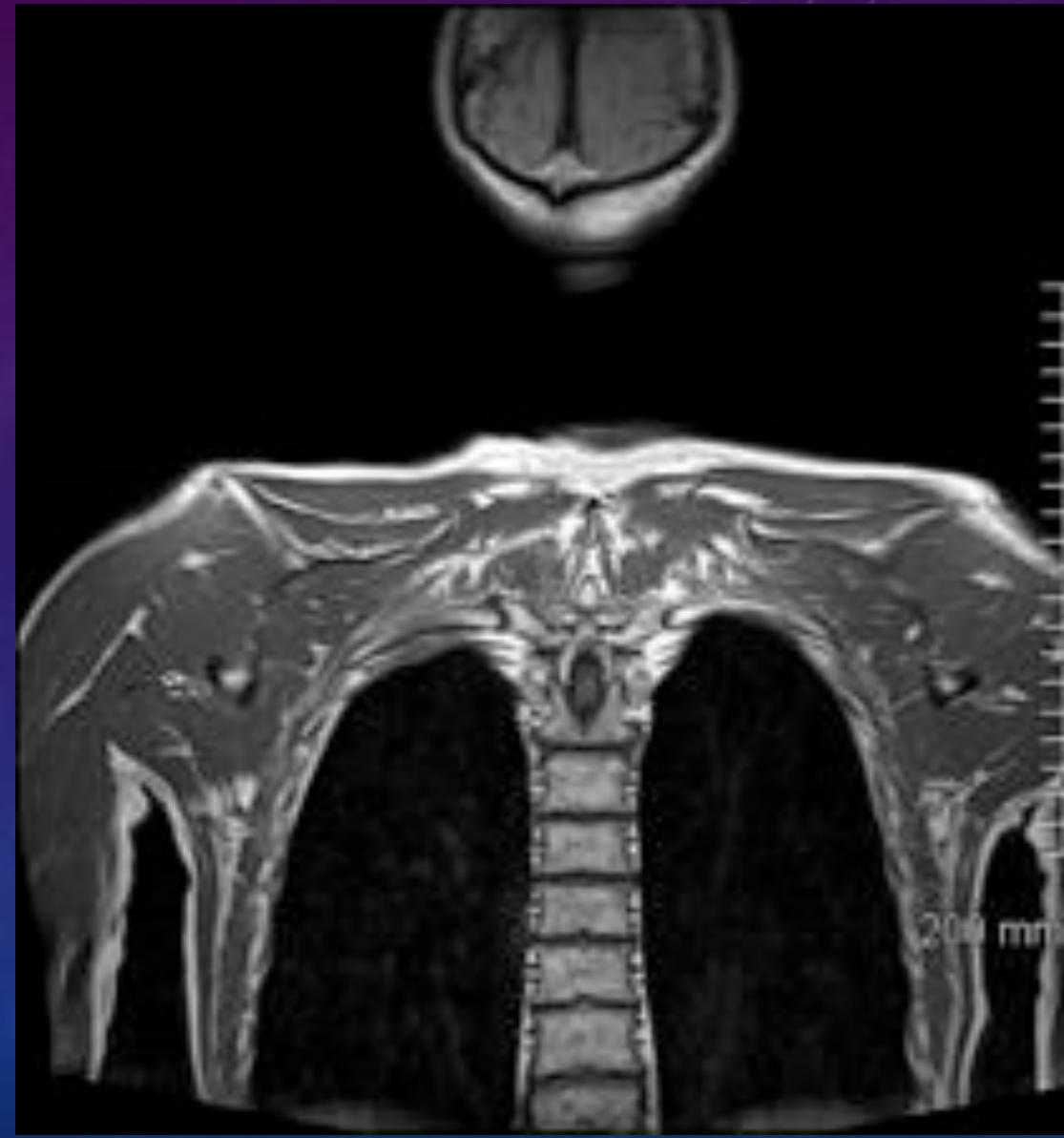
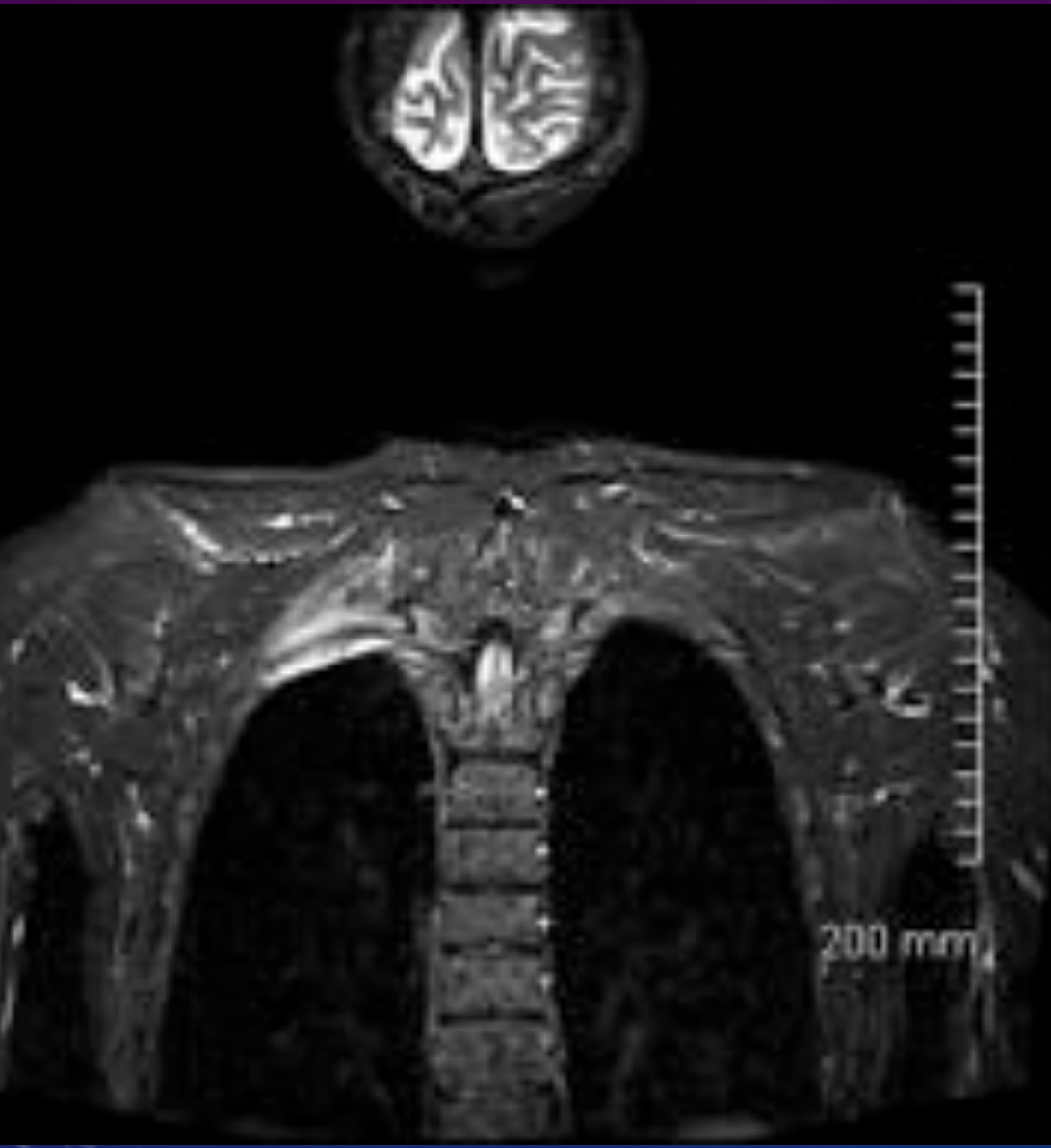


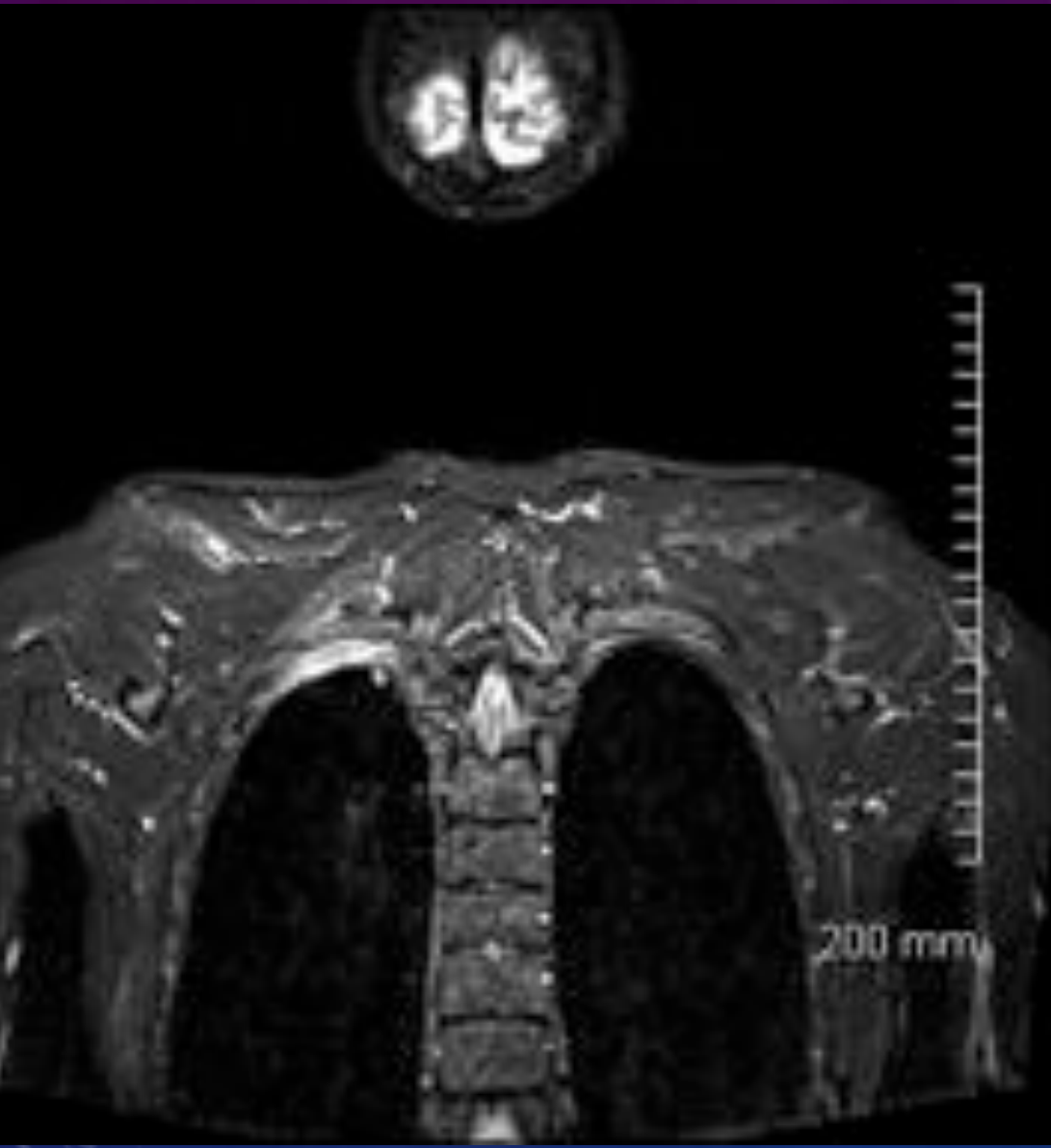


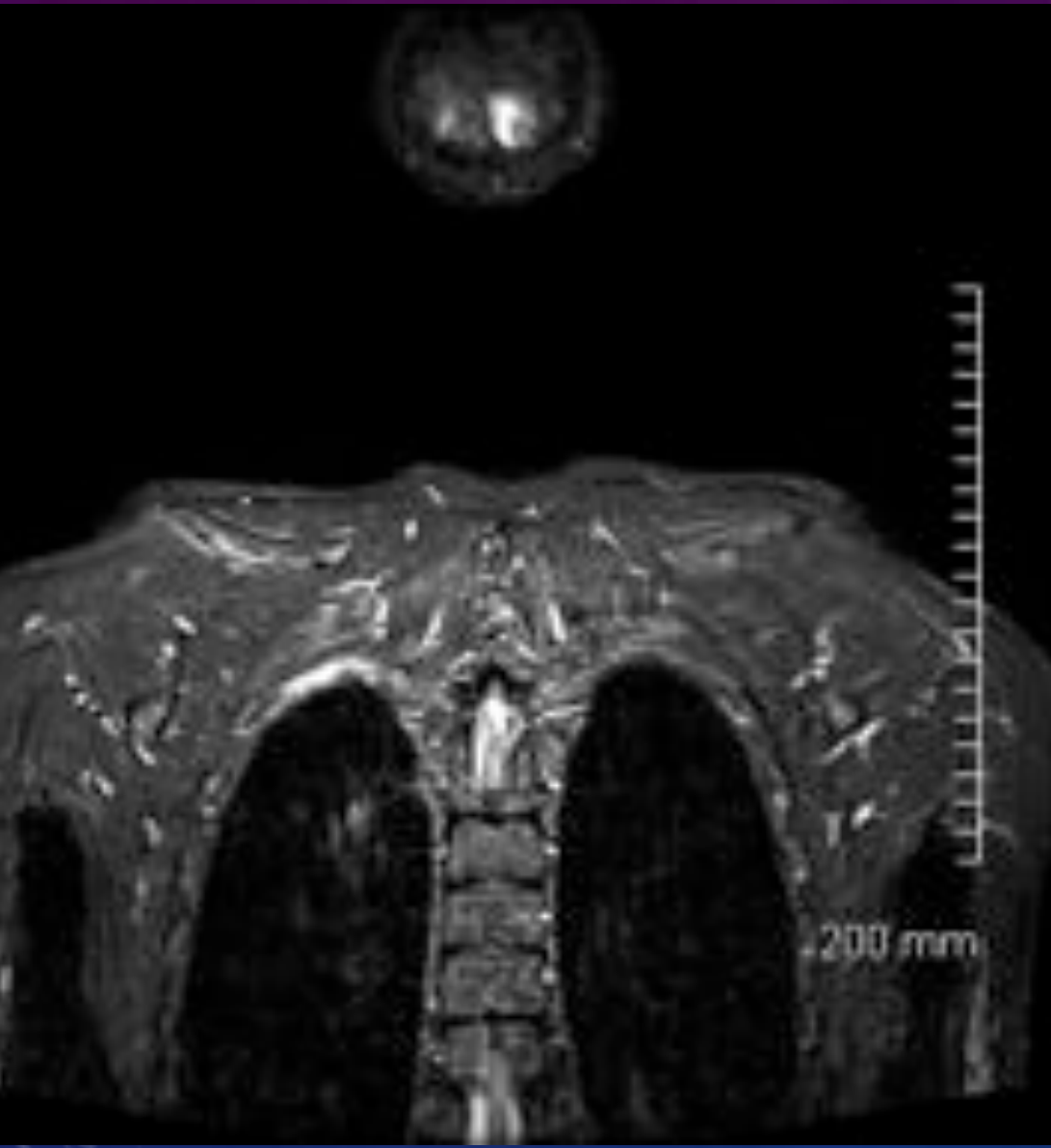


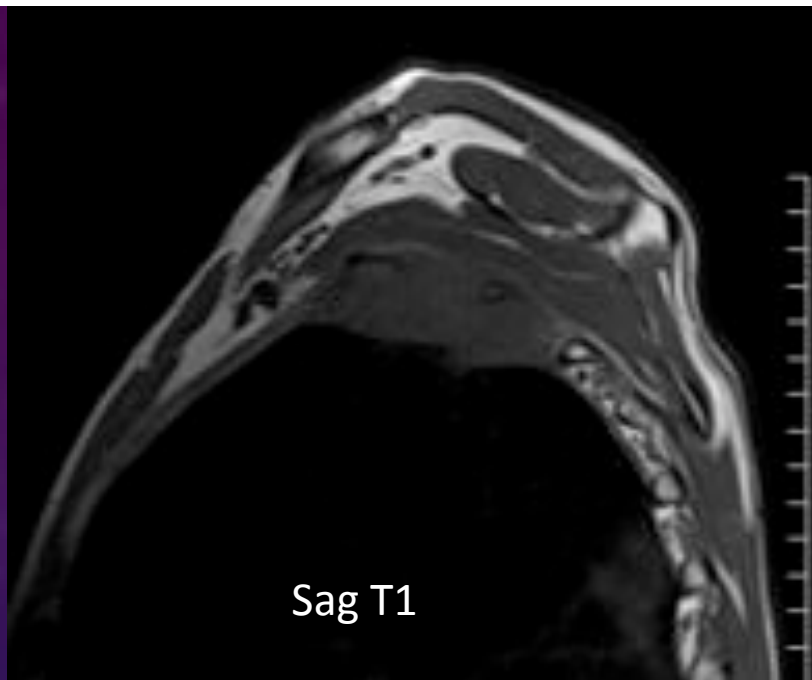




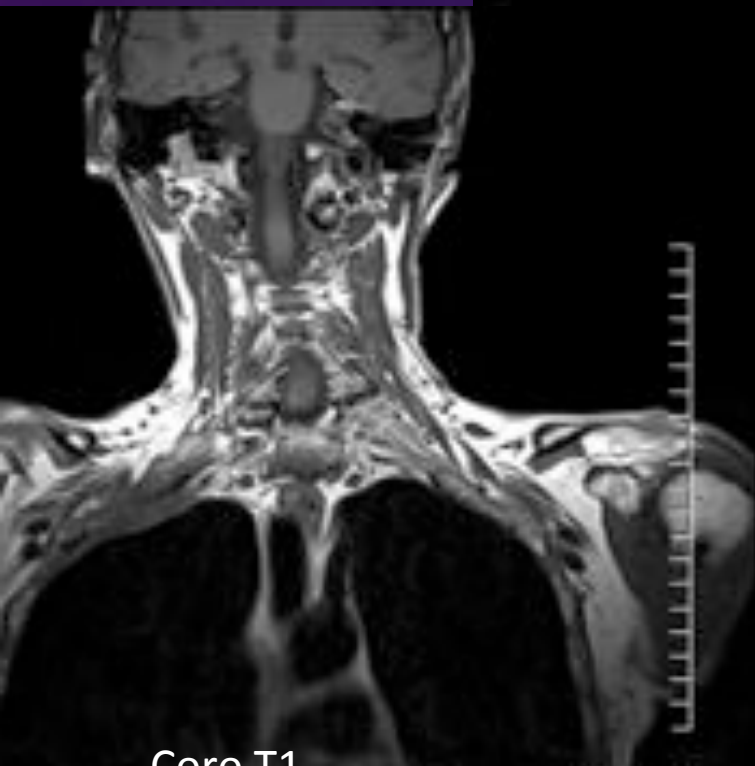
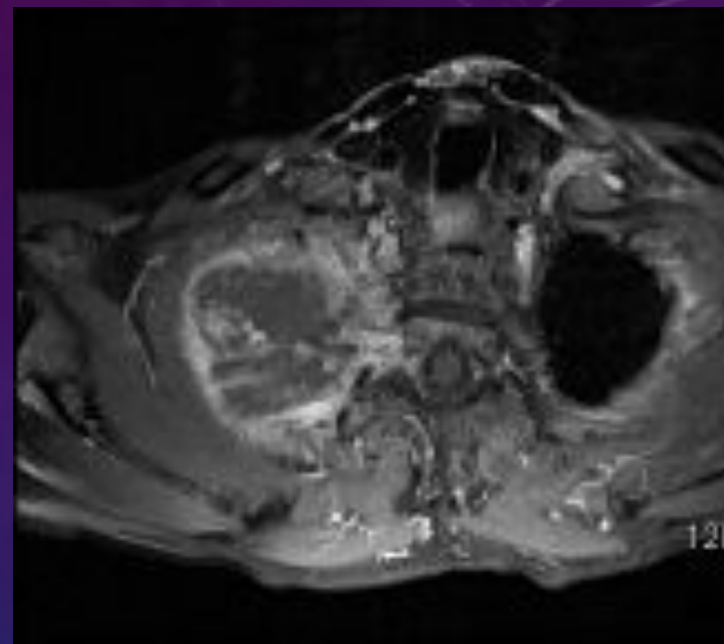




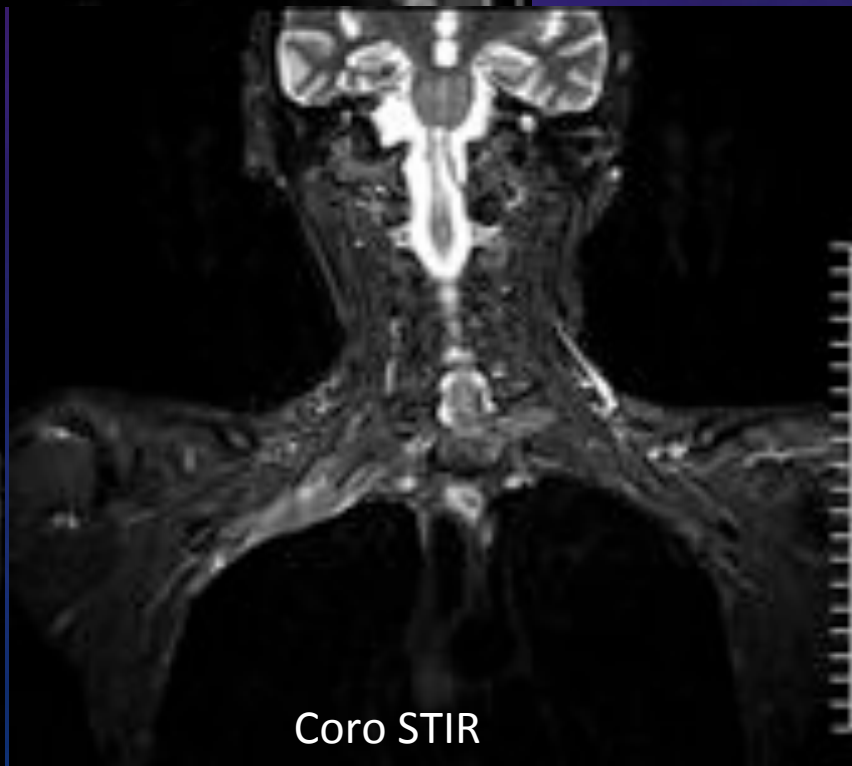




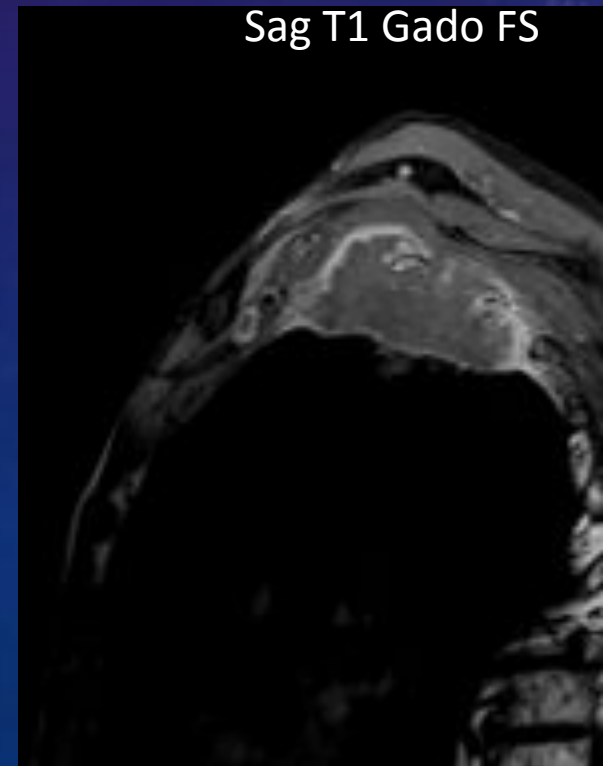
Sag T1



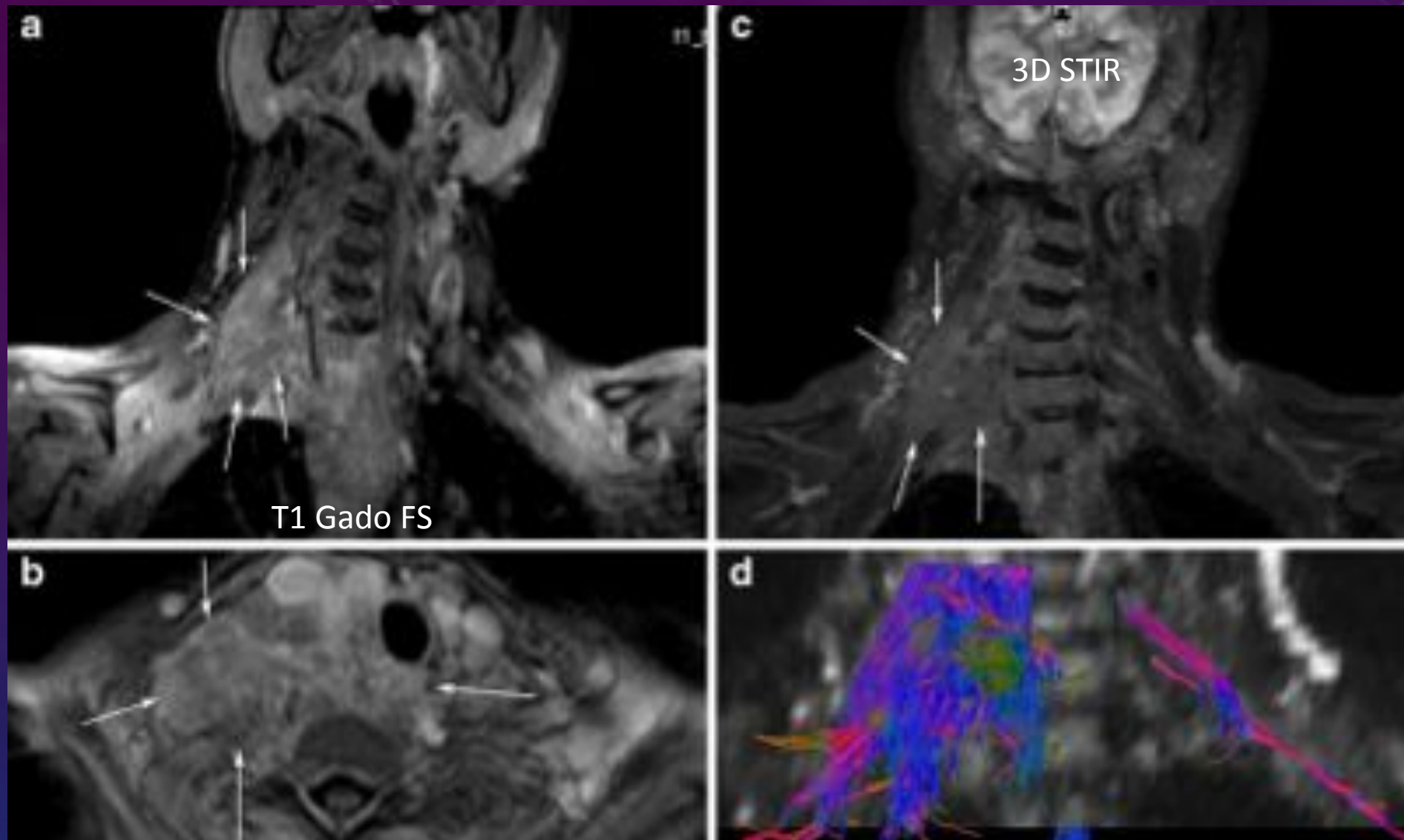
Coro T1



Coro STIR



Sag T1 Gado FS

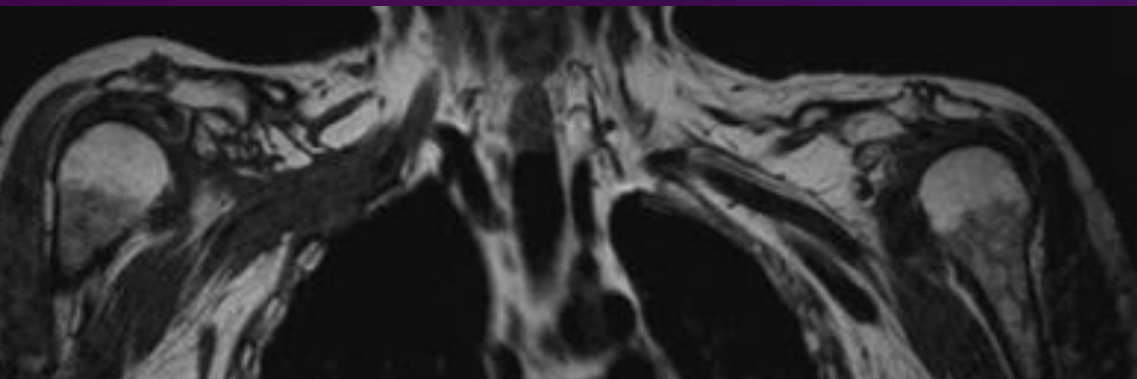


Patient de 65 ans avec un adénocarcinoma pulmonaire et une lésion du plexus brachial droit, la tractographie montre une désorganisation et une interruption des fibres nerveuses.

Vargas et al. Neuroradiology (2010) 52:23

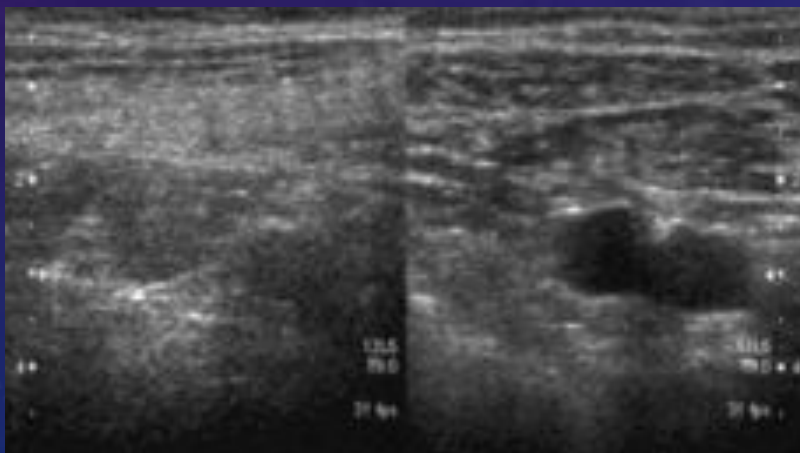
TUMEUR/ FIBROSE

rose post-thérapeutique du plexus brachial



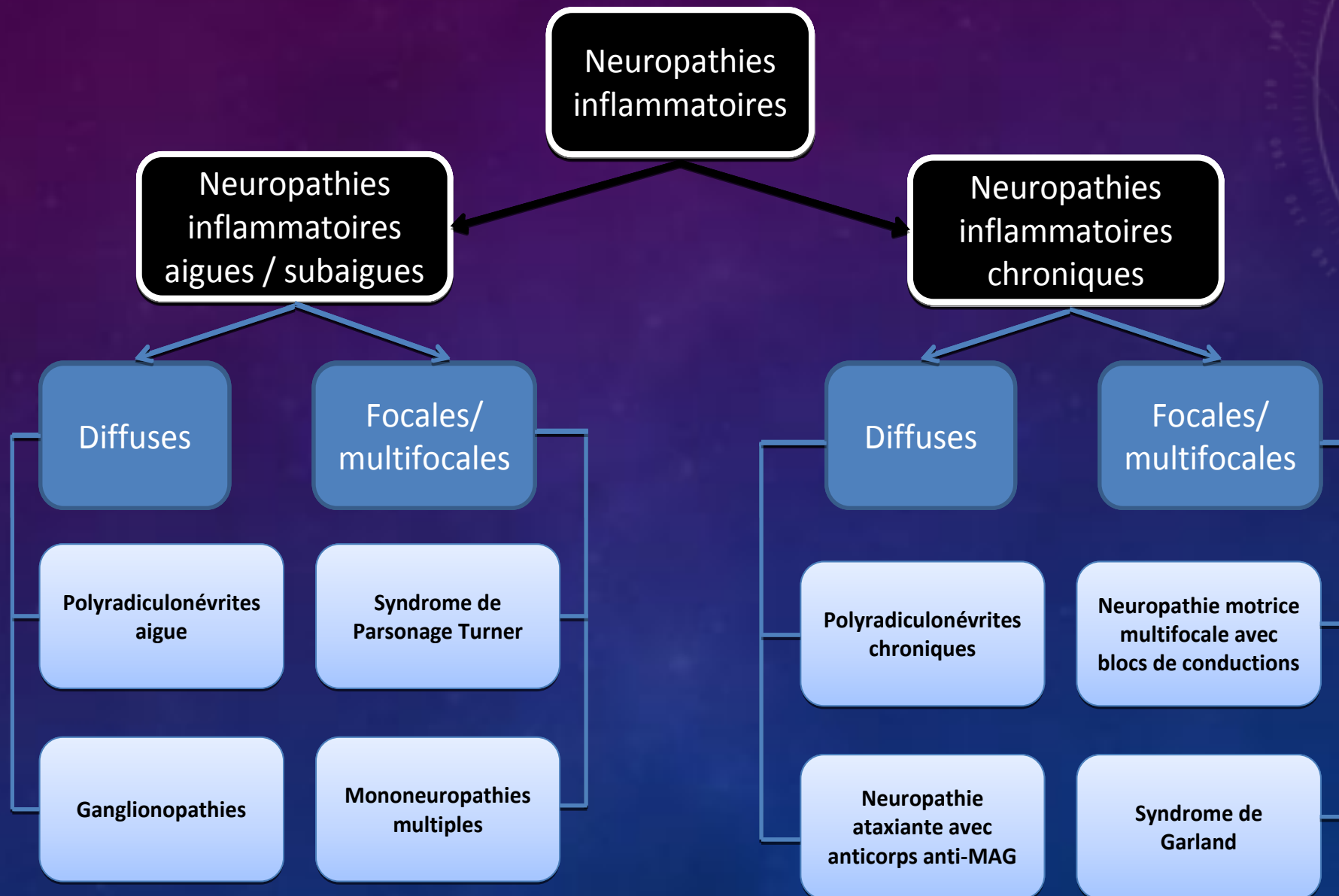
masse mal limité, hypoT1, Hyper T2, PdC => fibrose? K?

- Intérêt du sagittal T1 dans les formes débutantes
- Coronal Stir
- Tumeurs extrinsèques :
 - K pulmonaire (Pancoast Tobias), méta (sein, poumon, lymphome)
- Tumeur versus fibrose
- Souvent même terrain (atcd de néo du sein irradié), l'évolution dans le temps est parfois nécessaire au diagnostic
- **Pas de fixation de la fibrose au TEP scan.**



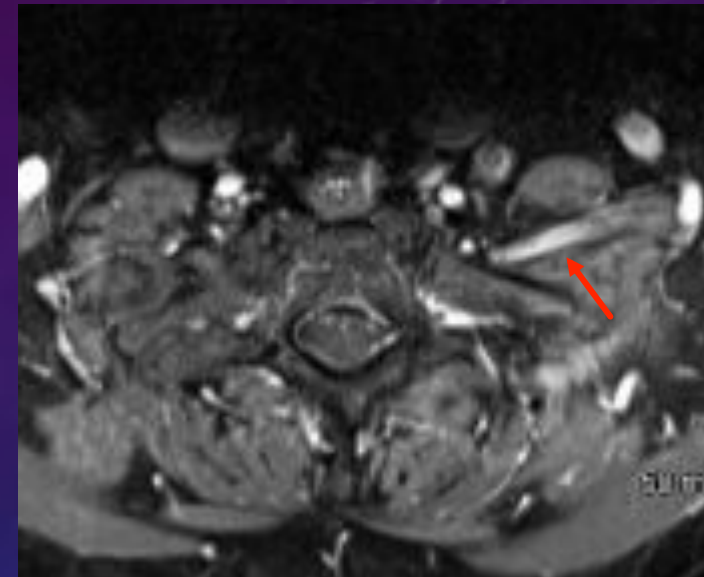
Echo=> peu échogène

NEUROPATHIE INFLAMMATOIRES / INFECTIEUSES

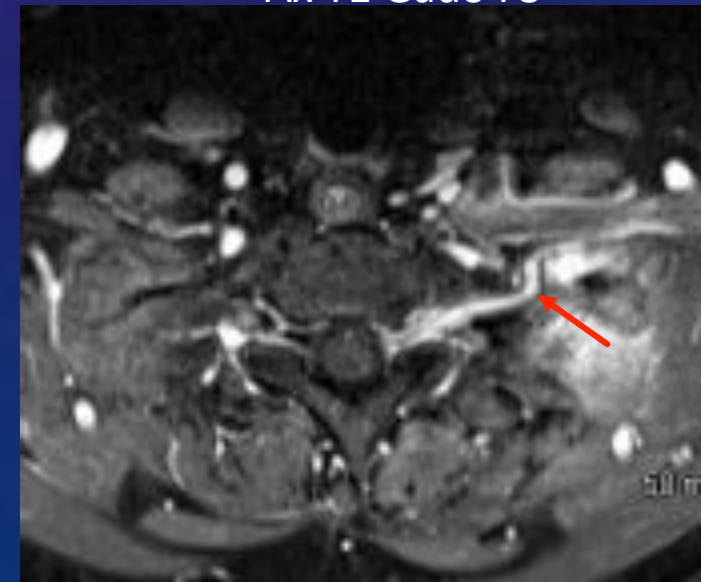


1 ATTEINTE INFECTIEUSES

Atteinte nerveuse du mb sup gauche chez une patiente immunodéprimée (greffe rénale).



Ax T1 Gado FS



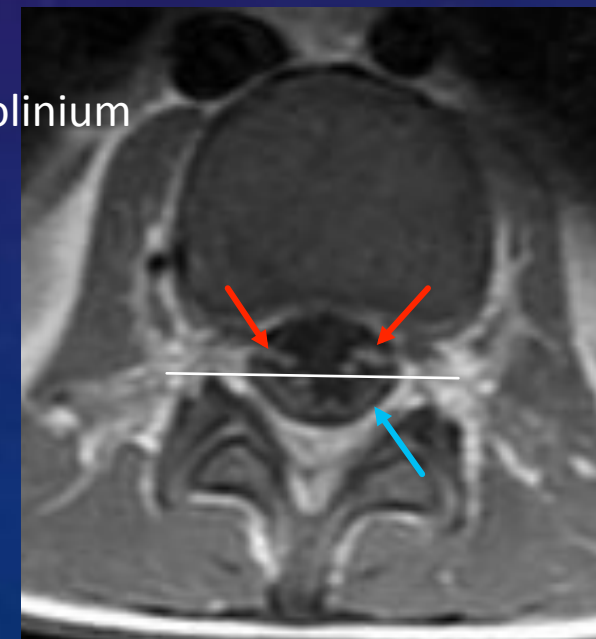
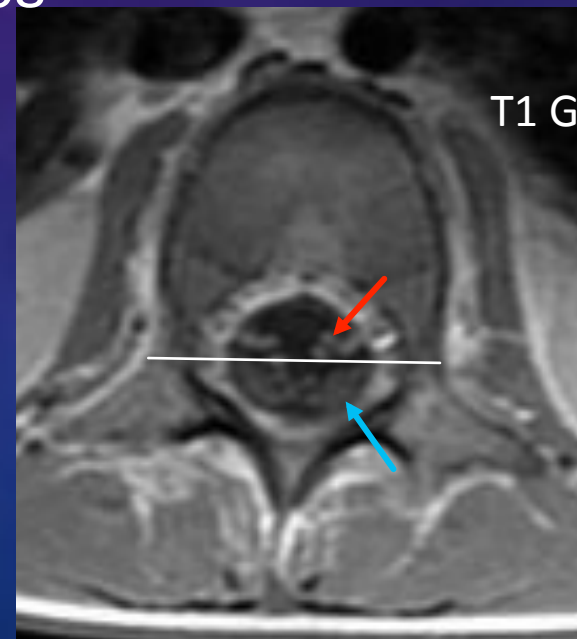
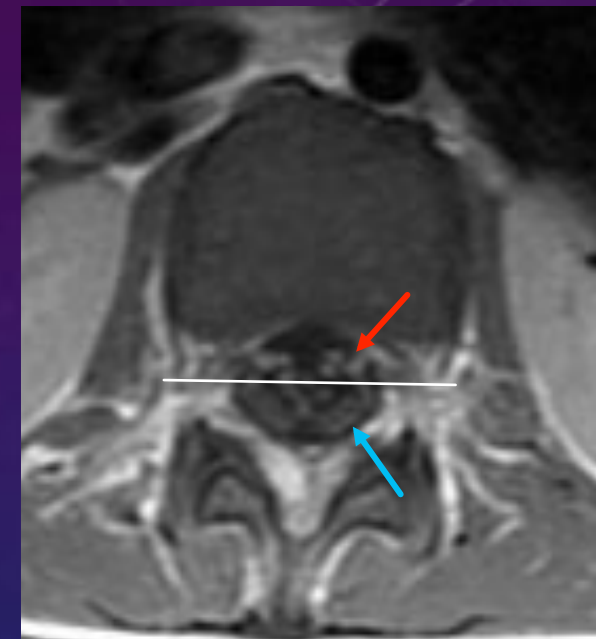
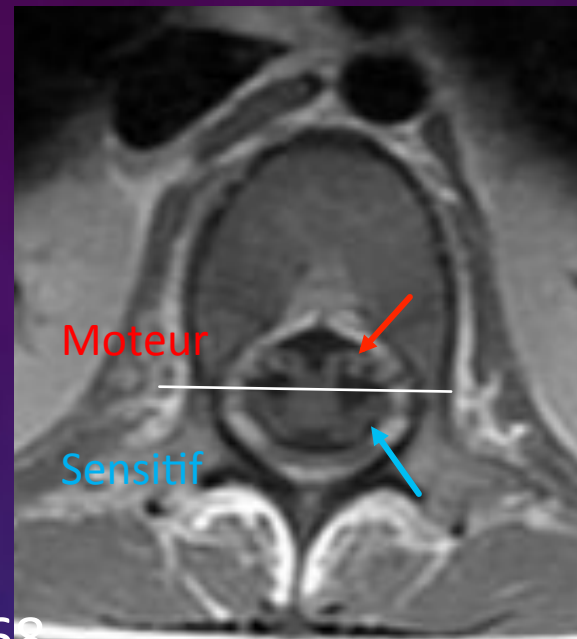
Plexite post VZV

ATTEINTE INFECTIEUSES

ENTEROVIRUS D68

Enfant de 4 ans admis en réa pour
pneumopathie grave et tétraplégie.
IRM encéphalique et médullaire normale.

Syndrome polio-like dû à un enterovirus D68

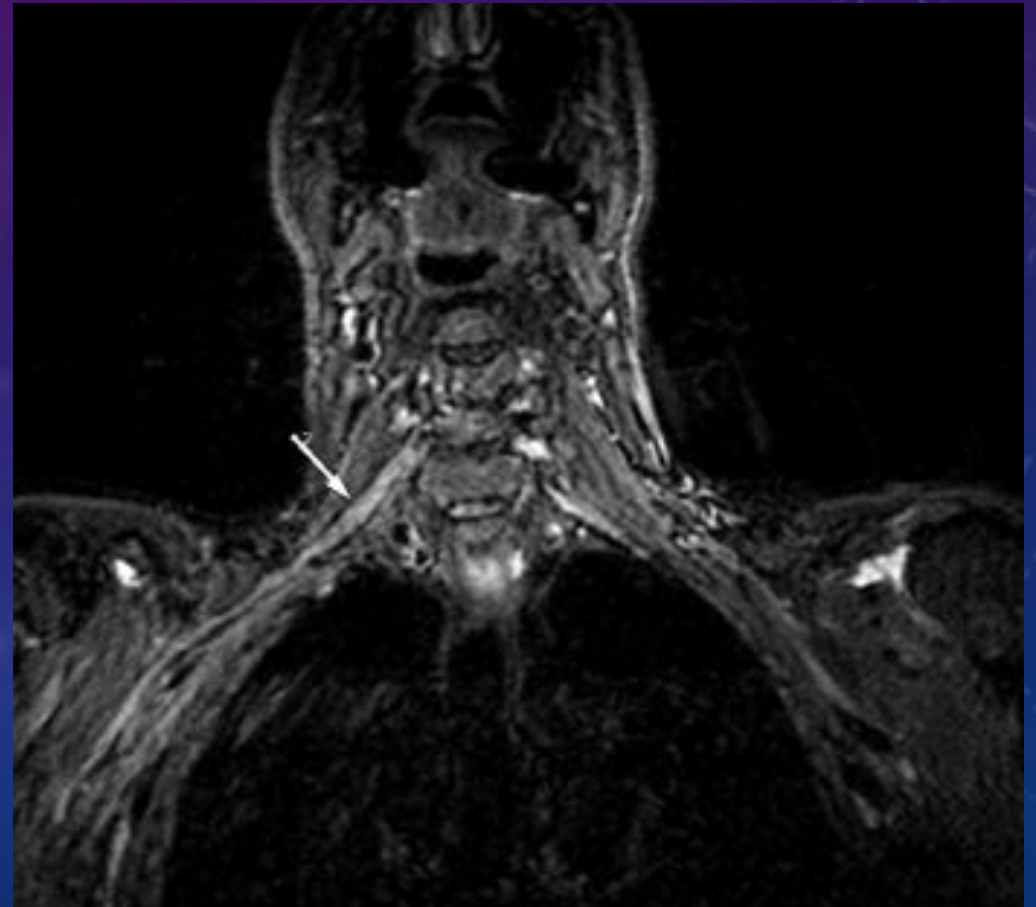
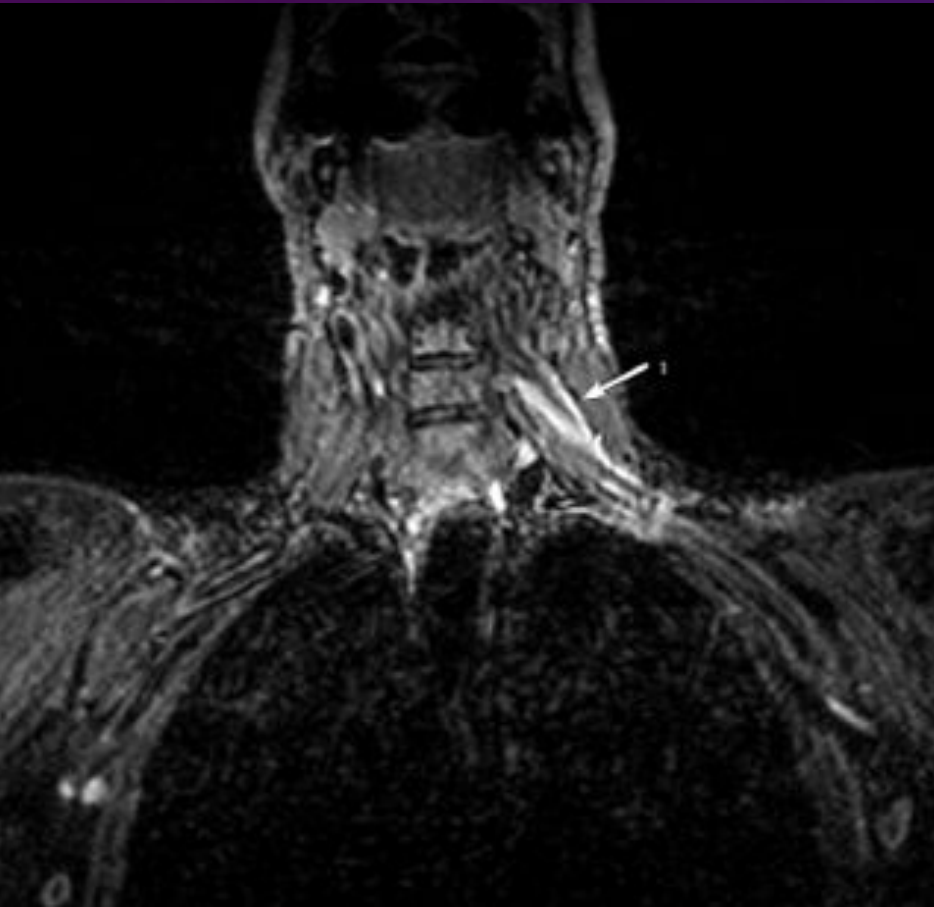


T1 Gadolinium

Acute flaccid paralysis following enterovirus D68 associated pneumonia, France, 2014. Euro Surveill Bull Eur Sur Mal Transm Eur Commun Dis Bull. 2014;19(44) Lang M, Mirand A, Savy N, Henquell C, Maridet S, Perignon R, et al.

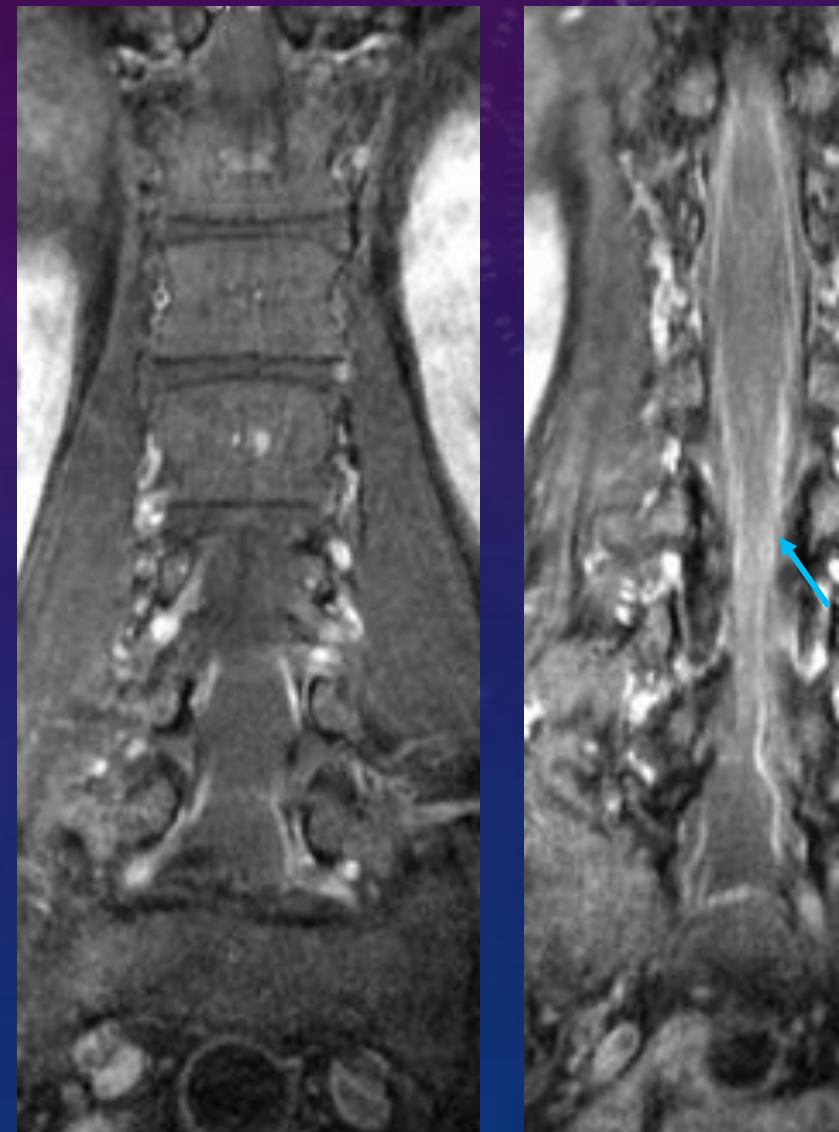
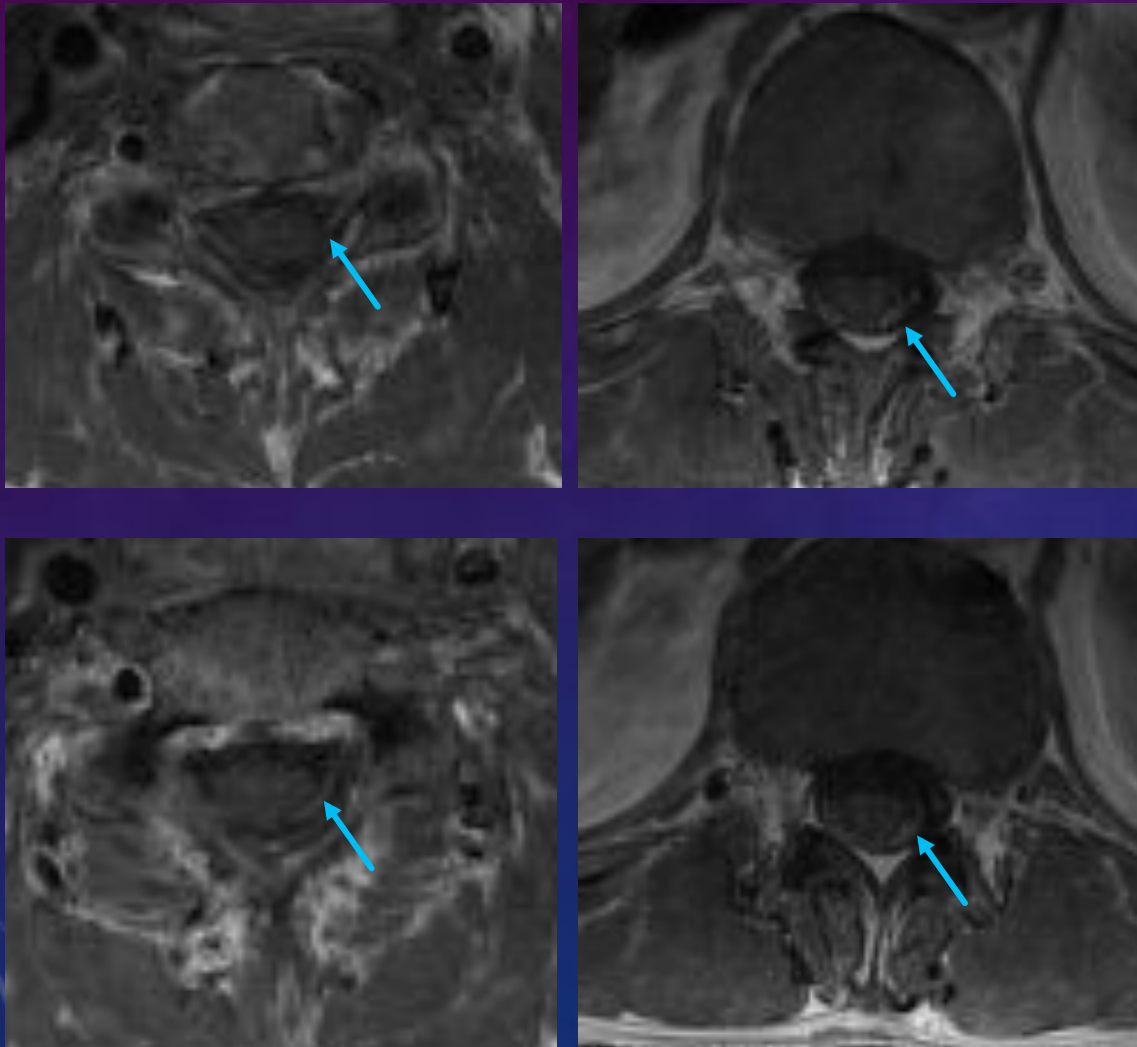
3 ATTEINTE INFLAMMATOIRE

Homme de 68 ans avec atteinte sensitive diffuse



4 ATTEINTE INFLAMMATOIRE

Homme de 68 ans avec atteinte sensitive diffuse



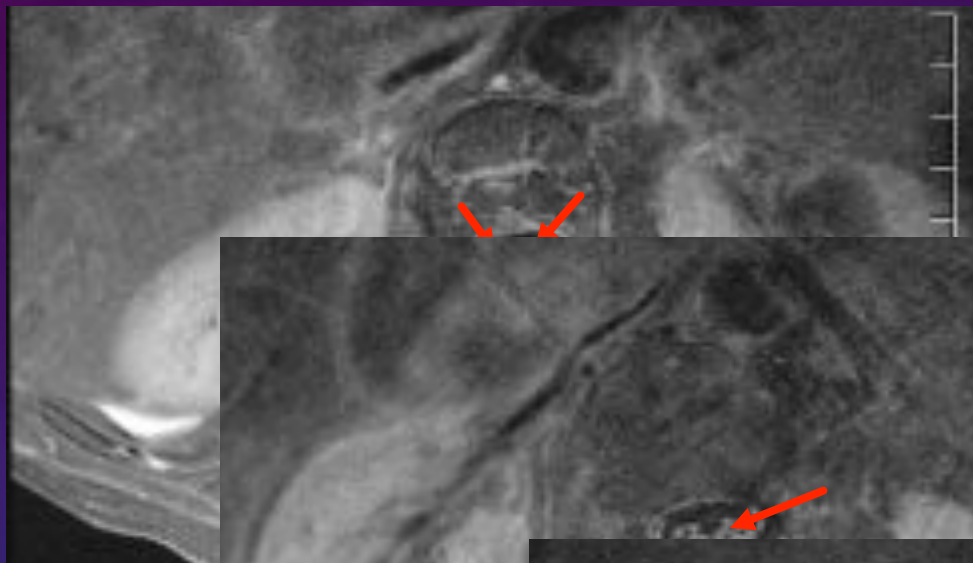
PRNC sensitive d'un Gougerot-Sjögren
confirmé par BGSA

5 PRNA : GUILLAIN BARRÉ

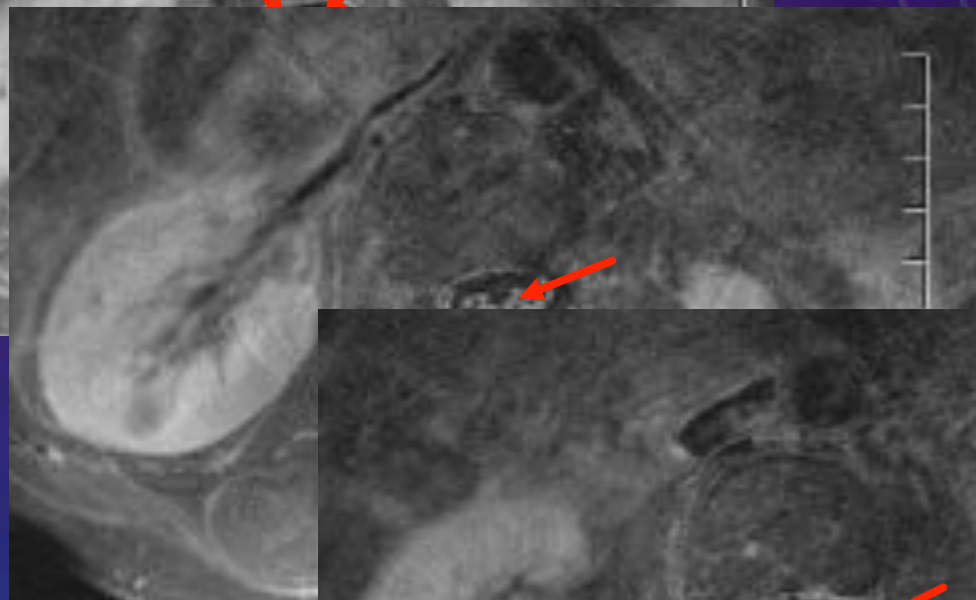
me 50 ans, sciatalgie puis déficit ascendant



Sag T1 Gado FS



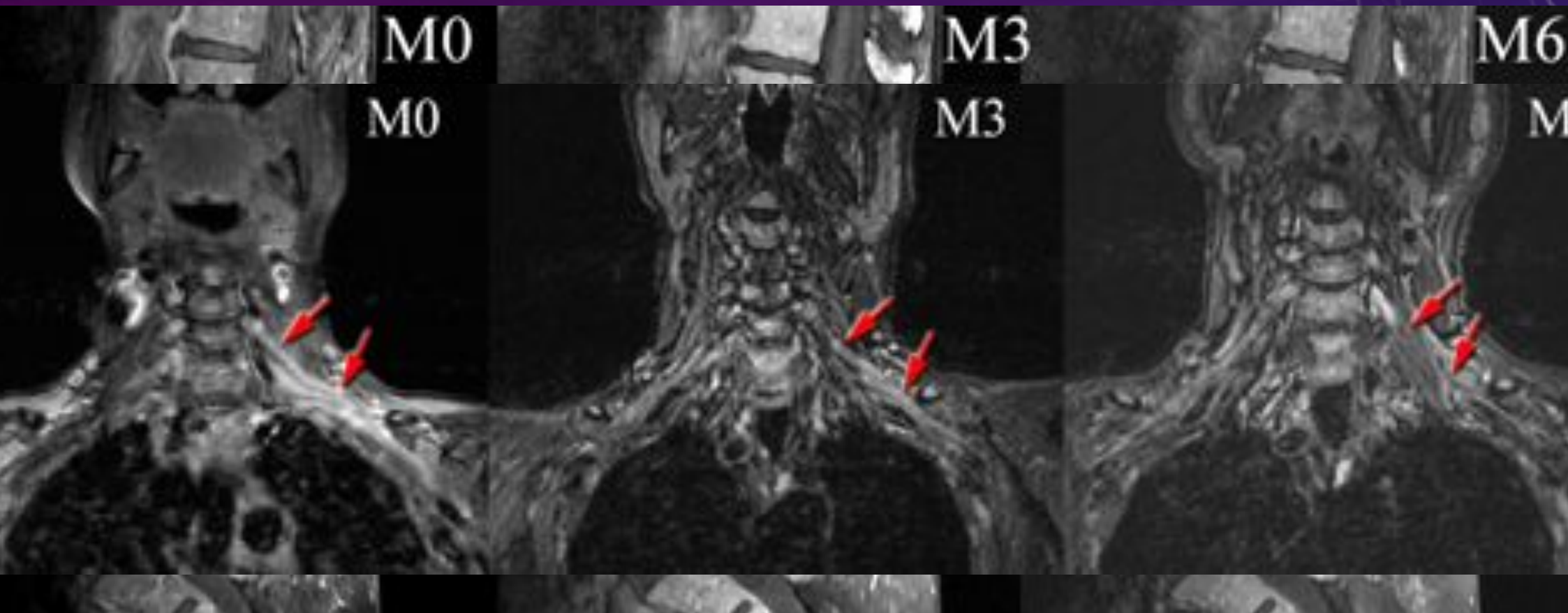
Ax T1 Gado FS



Racines agglutinées
hypertrophiées
prenant le contraste
fortement

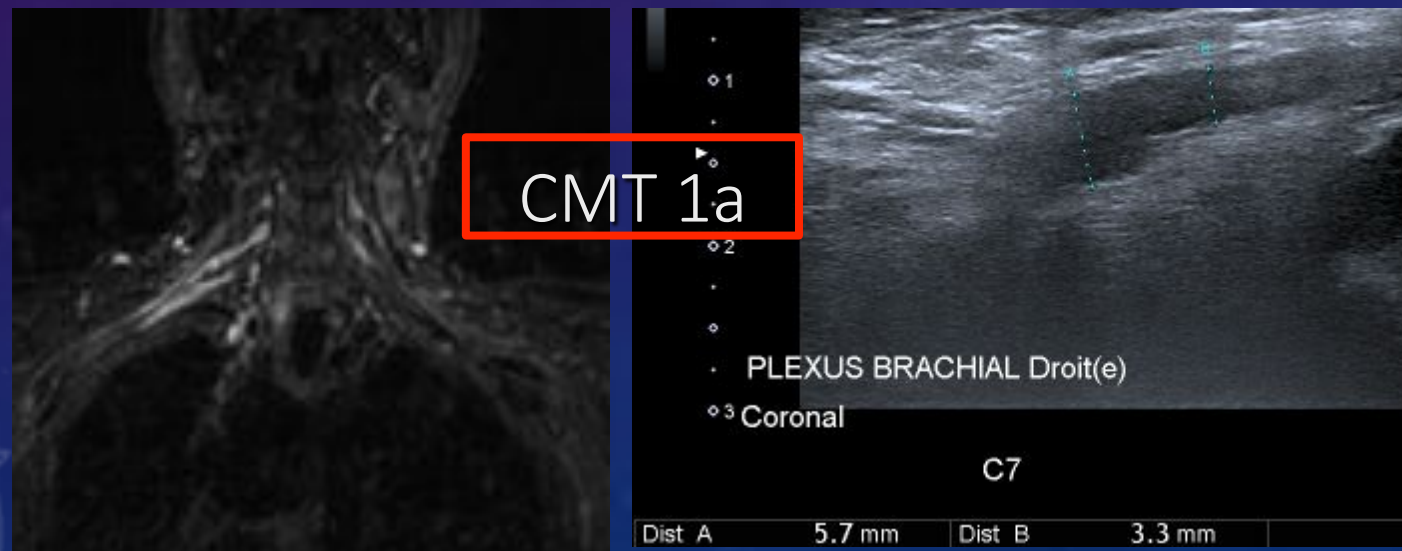
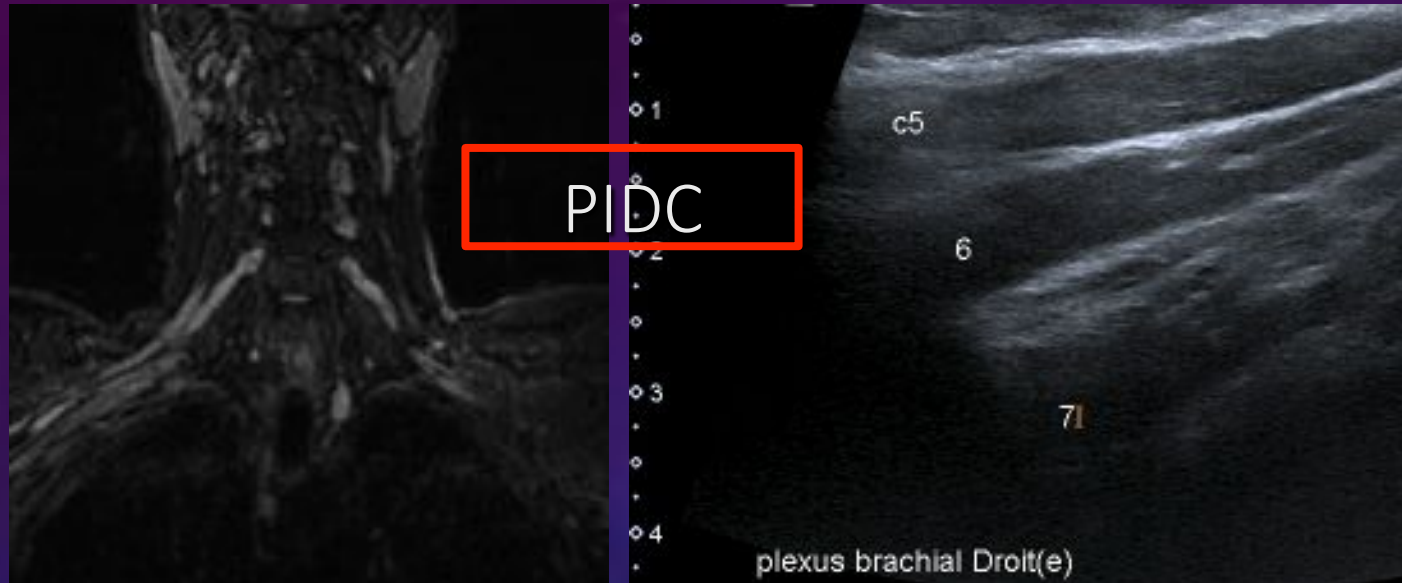
PRNC SUR WALDENSTROM (BING NEEL SYNDROM)

ient traité pour un Waldenström avec atteinte nerveuse chronique bilan avant nouveau traitement (ibrutinib) et su



Efficacy of ibrutinib in the treatment of Bing-Neel syndrome. Am J Hematol. mars 2016;91(3):E17-9
Cabannes-Hamy A, Lemal R, Goldwirt L, Poulain S, Amorim S, Pérignon R, et al..

Tous les gros nerfs / plexus
ne sont pas des neuropathies inflammatoires !



Principales étiologies
d'élargissement diffus de
nerfs périphériques:

- Diabète
- Lèpre
- Acromégalie
- Charcot-Marie-Tooth

SYNDROME DE PARSONAGE ET TURNER

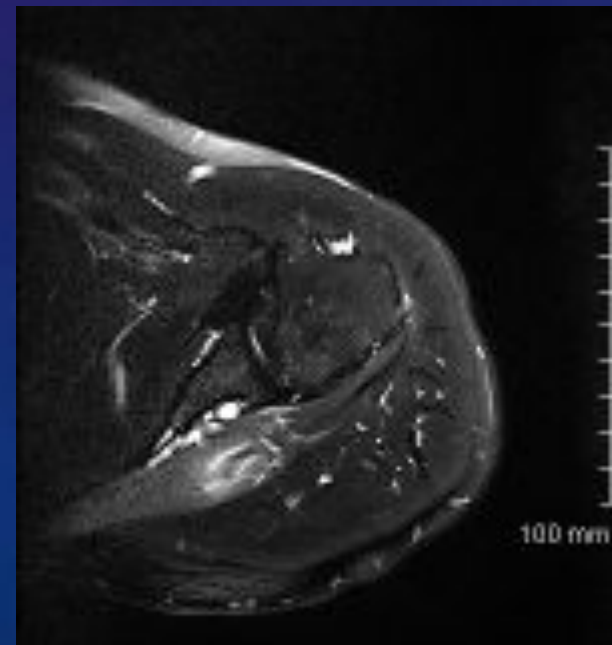
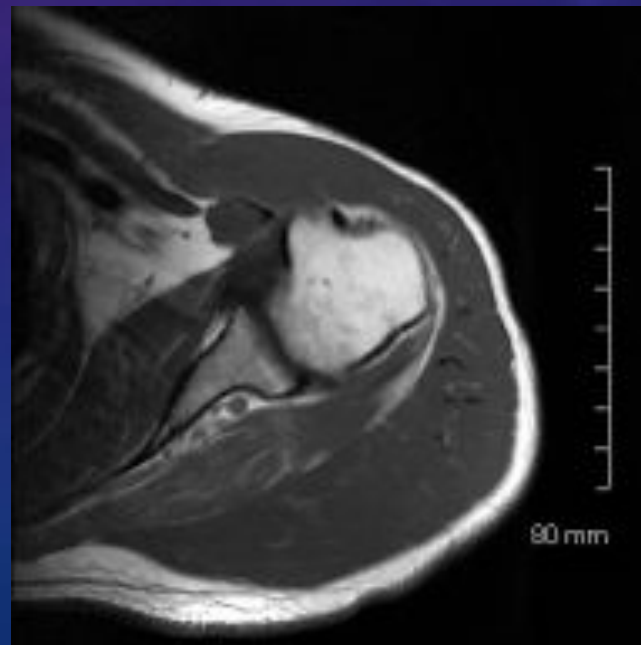
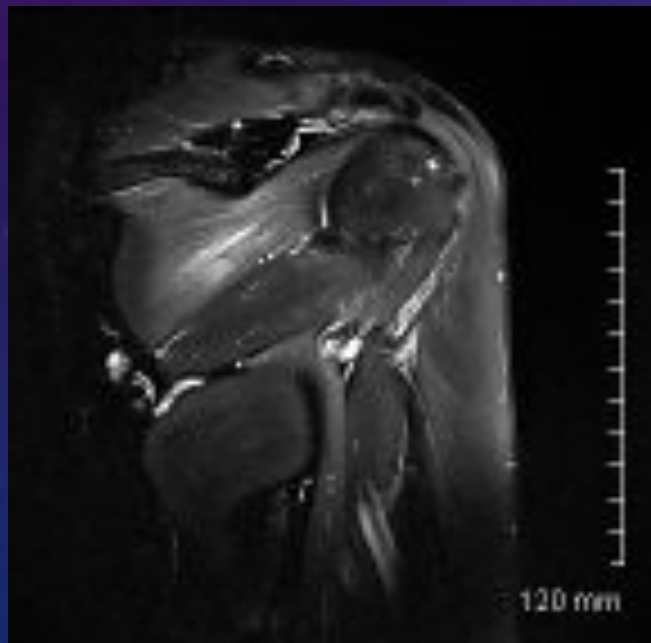
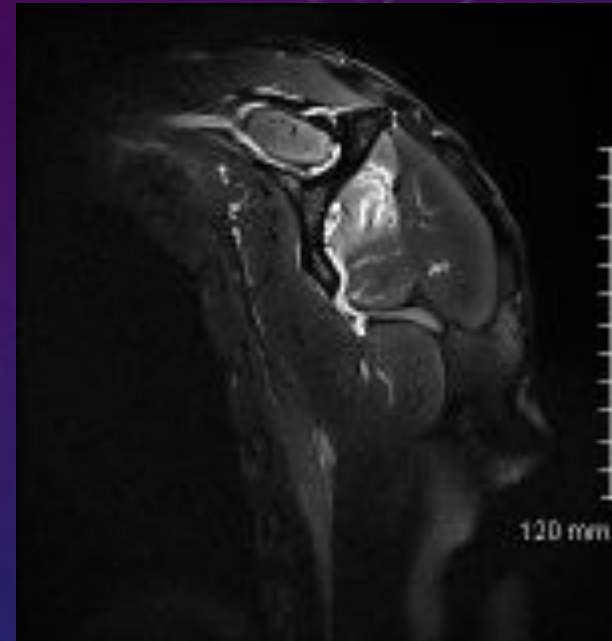
Autre appellations : Névrite brachiale aigue, amyotrophie névralgique de l'épaule

Incidence $<2/100000$, Prédominance masculine (2/1), Bilatéral dans 1/3 cas

Souvent précédé par épisode fébrile, vaccination, accouchement... Etiologie (viral, auto-immun ?)

Douleur brutale + déficit moteur,

EMG positif dès 3 semaines, nerf supra scapulaire (atteint dans 97%, isolé 50%)





MERCI DE VOTRE ATTENTION !

Dr PERIGNON Renan
renan.perignon@hotmail.com