



SIFEM 2025

12 > 14 JUIN | CNIT FOREST PARIS



MYOME/SARCOME : COMMENT JE M'EN SORS ?

Cendos ABDEL WAHAB

Marie Florin, Isabelle Thomassin-Naggara

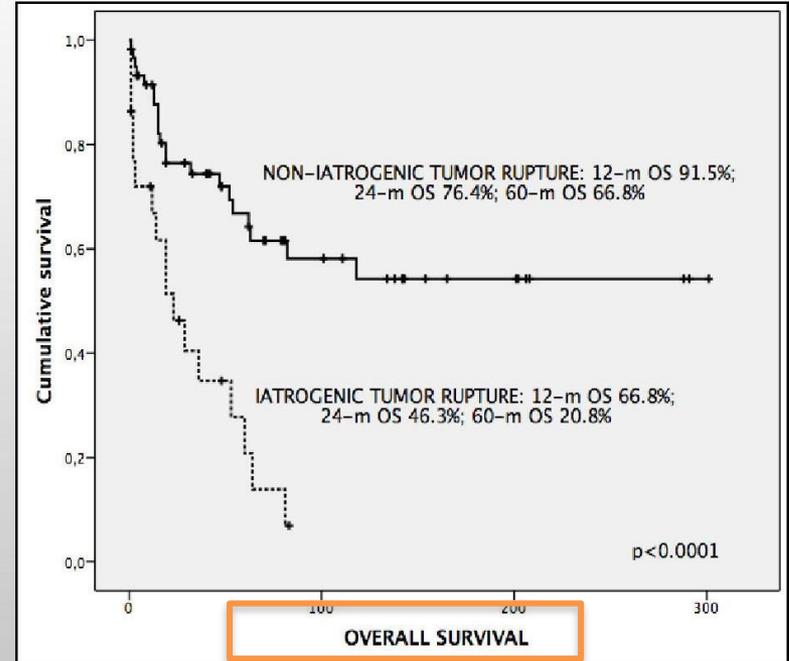


INTRODUCTION

- Myome utérin : fréquent +++ :
 - 50% des femmes de < 50 ans
 - 70-80% des femmes ≥ 50 ans
- Enjeu thérapeutique actuel : descente avec développement des techniques mini-invasives, embolisation, traitement médicamenteux pour les myomes
- En période d'activité génitale : préservation fertilité +++ (morcellation possible en cas de chirurgie)
- Eliminer sarcome +++

ENJEU : NE PAS SOUS-ESTIMER LE SARCOME UTERIN

- La morcellation a un impact significatif sur la survie globale et la survie sans récurrence.
- Diminution de 14 à 40 % contre 65 à 71 % à 5 ans.





European Society of Urogenital Radiology (ESUR) Guidelines: MR Imaging of Leiomyomas

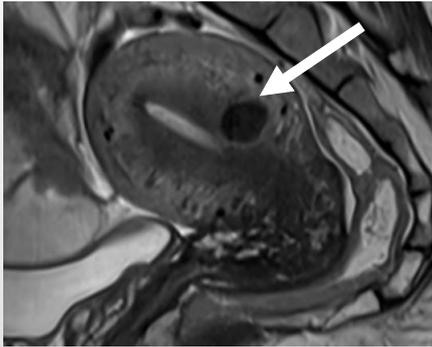
Rahel A. Kubik-Huch¹ · Michael Weston² · Stephanie Nougaret^{3,4} · Henrik Leonhardt⁵ ·
Isabelle Thomassin-Naggara⁶ · Mariana Horta⁷ · Teresa Margarida Cunha⁷ · Cristina Maciel⁸ · Andrea Rockall^{9,10} ·
Rosemarie Forstner¹¹

PROTOCOLE DE BASE	SEQUENCES OPTIONNELLES
<ul style="list-style-type: none">➤ Deux plans T2 : Sagittale et axiale<ul style="list-style-type: none">▪ Anatomie,▪ Caractérisation,▪ Cartographie➤ Axiale T1 :<ul style="list-style-type: none">▪ Adénomyose▪ Graisse, hémorragie➤ Axiale T2 haut abdomen :<ul style="list-style-type: none">▪ Grandes tumeurs,▪ Obstruction rénale,▪ Métastases	<ul style="list-style-type: none">➤ Axiale T1 Fat Sat :<ul style="list-style-type: none">▪ Graisse, Sang➤ Coronale oblique T2 :<ul style="list-style-type: none">▪ Relation avec la cavité utérine,▪ Origine ovarienne➤ T1 après injection de gadolinium (acquisition dynamique ou DCE) :<ul style="list-style-type: none">▪ Caractérisation▪ DD▪ Embolisation➤ Diffusion (b 1000 - 1400) :<ul style="list-style-type: none">▪ Caractérisation myome atypique,▪ Embolisation

PREPARATION DE LA PATIENTE :

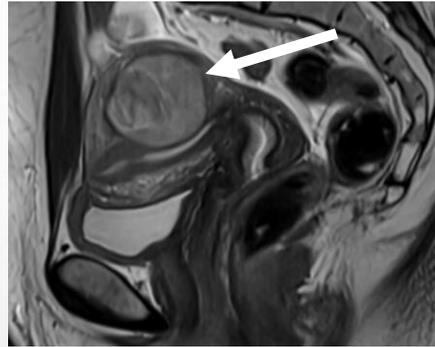
- Examen **quelque soit le jour du cycle**
- Questions **cliniques** avant l'examen (DDR, symptômes, hormonothérapie, atcd chirurgie)
- **Jeûne** de 3 à 6 heures
- **Antiperistaltiques** (20mg de butylscopolamine IM / IV ou 1mg de glucagon IV)
- **Bandes de contention** ou sac de sable
- **Vessie en semi-réplétion**

SIGNAL T2



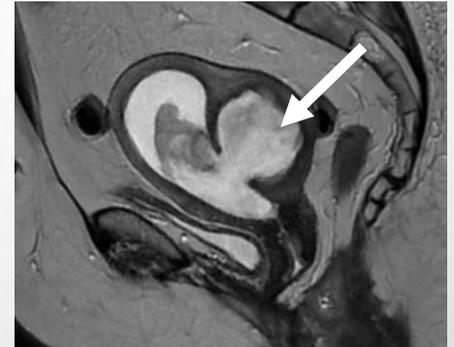
HYPO
signal T2
homogène

= PSOAS
< ou = MYOMETRE EXTERNE



Signal T2
intermédiaire

> MYOMETRE EXTERNE



HYPER
signal T2

= VESSIE

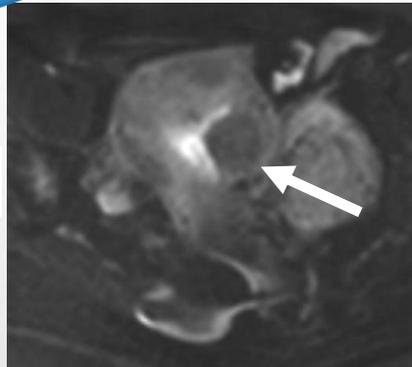
DIFFUSION : ANALYSE QUALITATIVE



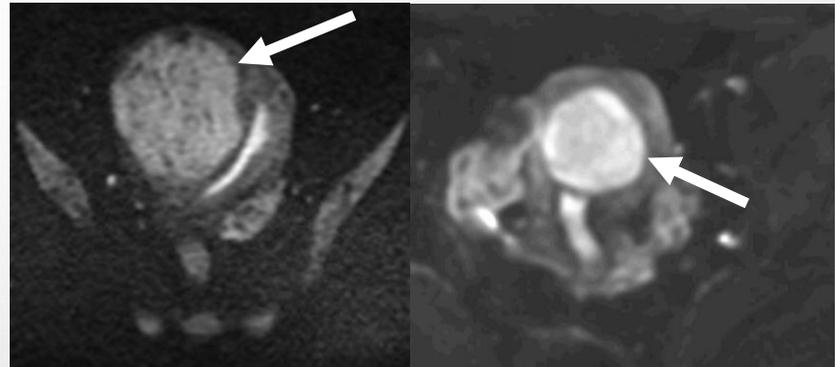
REFERENTIEL :
< OU = VESSIE
OU
MYOMETRE EXTERNE

DWI

HYPOSIGNAL DWI



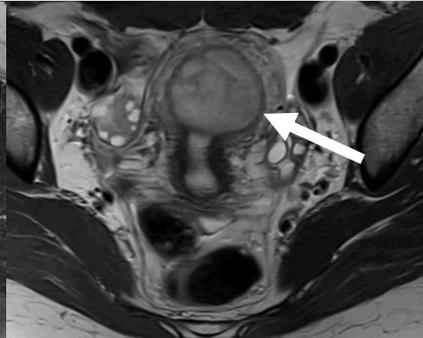
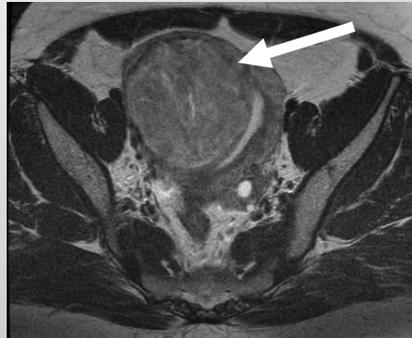
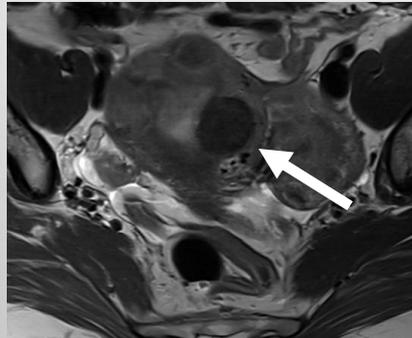
HYPERSIGNAL DWI



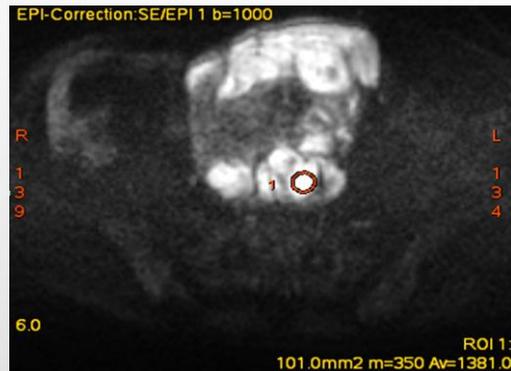
MODERE

ELEVE

T2

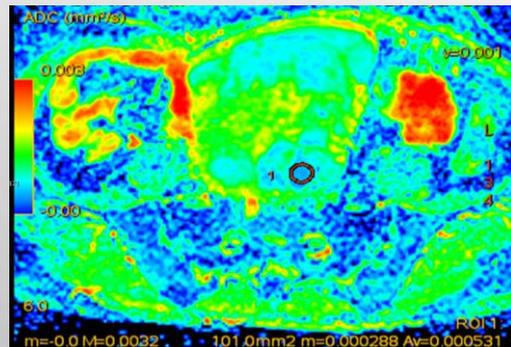


DIFFUSION : ANALYSE QUANTITATIVE



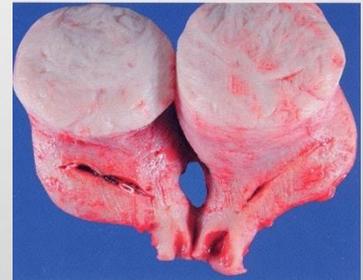
ROI :

- Circulaire 20-40 mm²
- Valeur moyenne avec 2 décimales
- **Zone tissulaire = rehaussée (pas de nécrose, pas d'hémorragie)**
- **Zone avec la plus petite valeur d'ADC si hétérogène**



MYOMES BÉNINS

- Remaniements intrinsèques dans 65% des cas
- Grande variété des sous types histologiques et remaniements possibles
- Grande variété des signaux en IRM



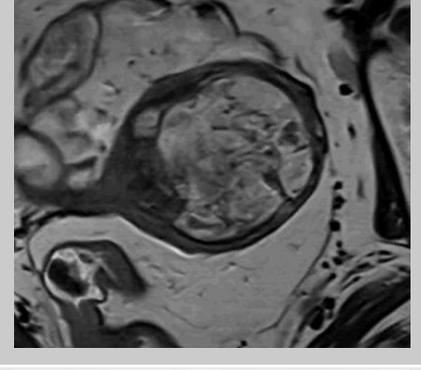
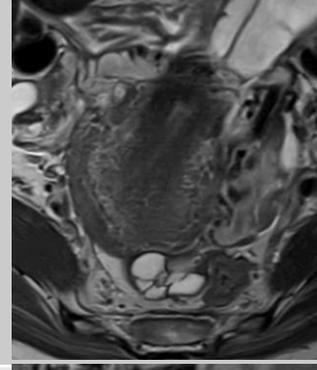
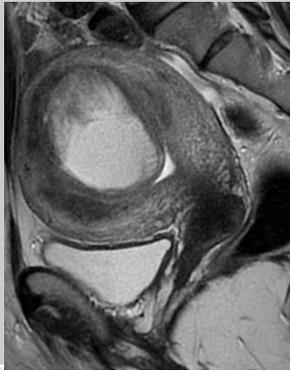
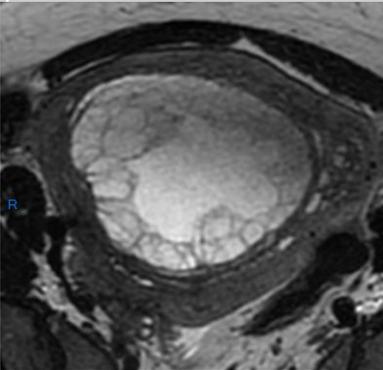
Kystique

**Hémorragique
Nécrobiose**

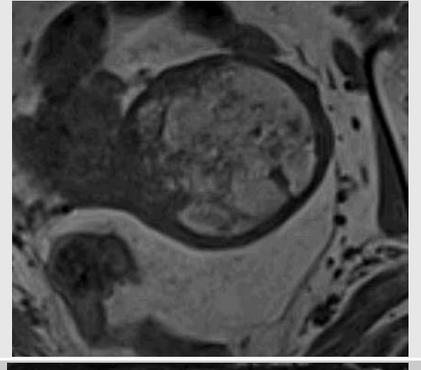
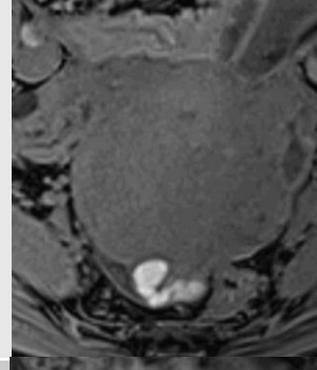
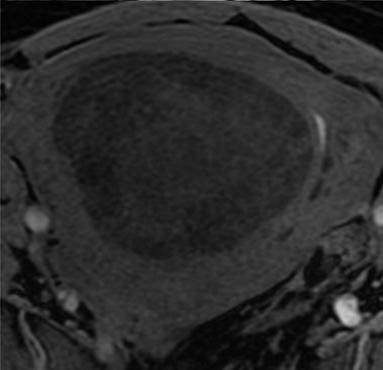
Adénomyome

Graisseux

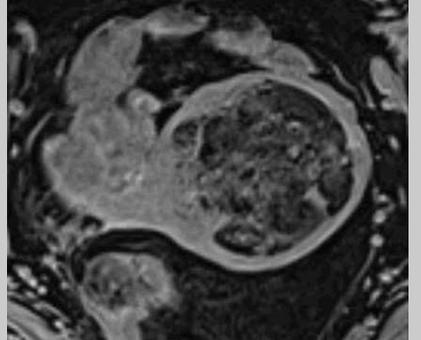
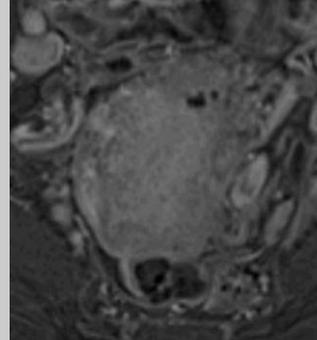
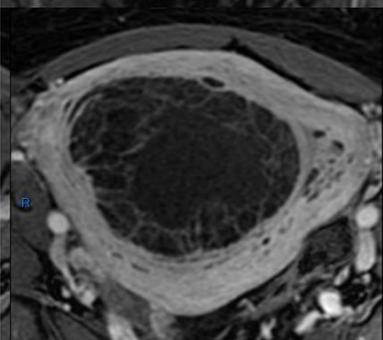
T2

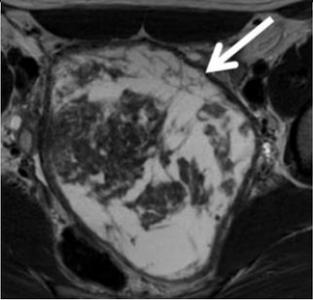
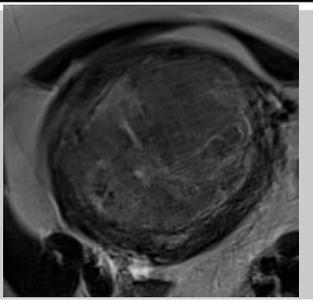
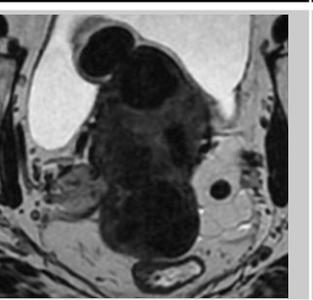
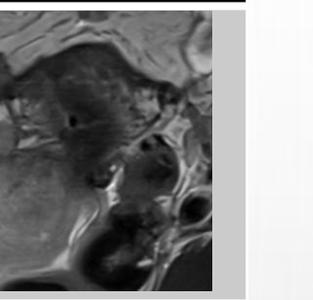
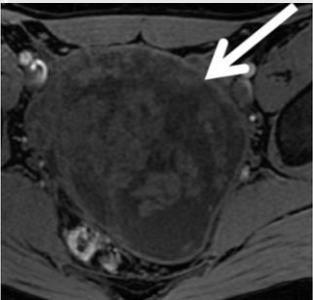
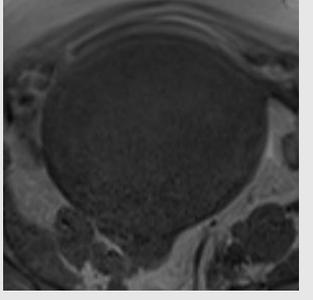
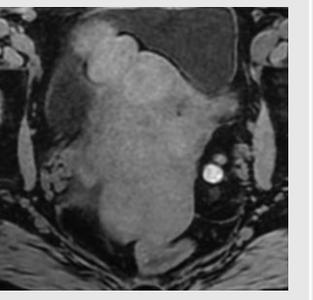
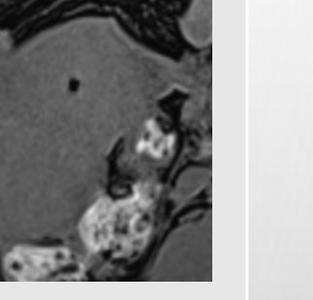
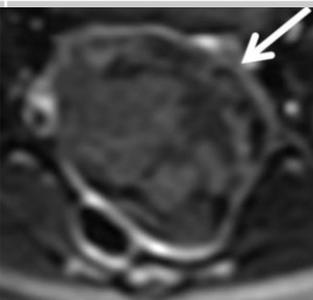
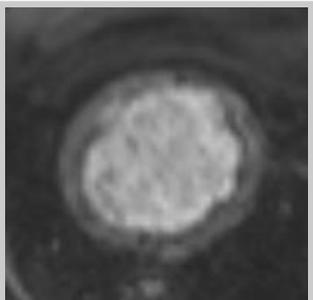
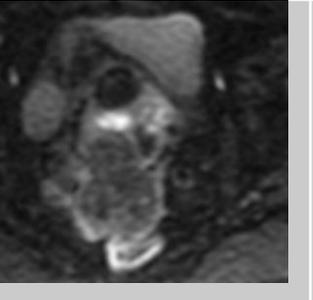
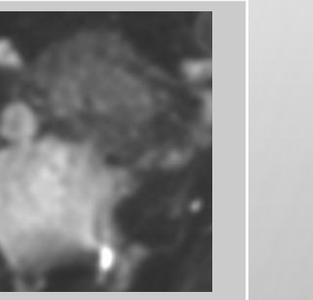
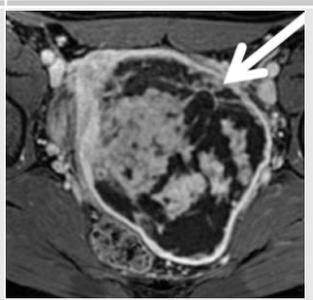
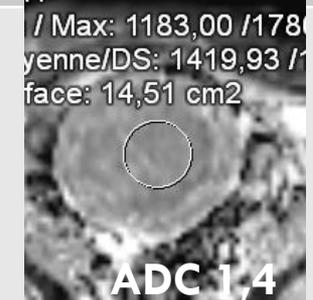
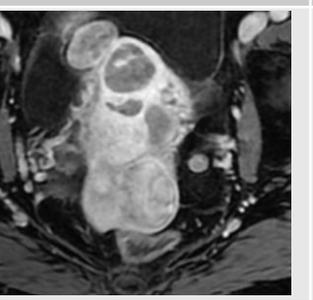
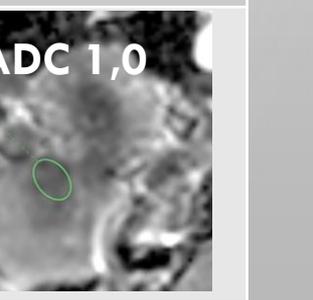


T1



T1
Gd+



	Myxoïde	Oedémateux	Hyalin	Cellulaire
T2				
T1				
DWI				
ADC / Gado				

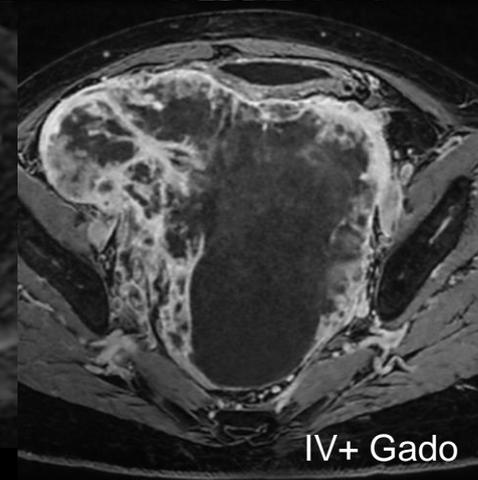
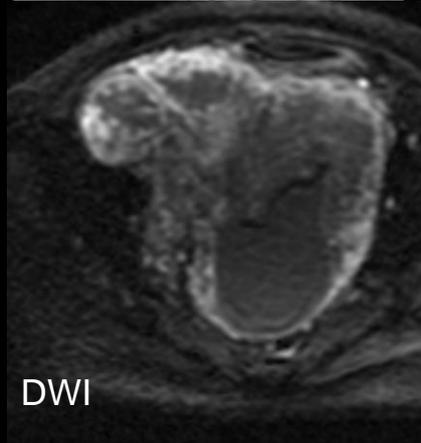
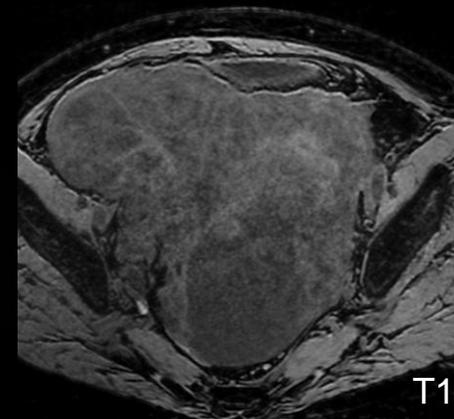
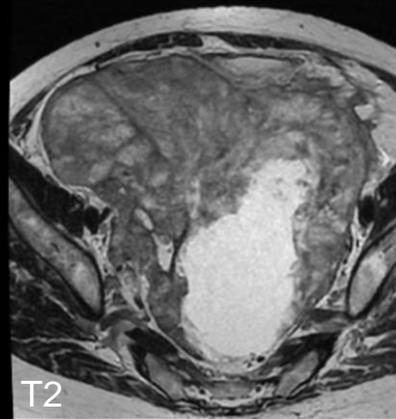
SARCOMES UTÉRINS

Aspect variable en IRM :

- Masse utérine **unique**
- Signal **T1** (hémorragie) et **T2** (intermédiaire)
- Morphologie : **contours irréguliers ++**
- DWI : **hypersignal** et **ADC bas**
- **Nécrose**
- +/- Adénopathies, implants péritonéaux

B.E.T.T.E.R. CHECK

			Se	Spe	
B	Borders	Contours irréguliers	74-84%	88-91%	Lakman et al. Eur Radiol 2017
E	Enhancement	Nécrose centrale	74-84%	86-91%	Lakman et al. Eur Radiol 2017
T	T1	Hémorragie intra-tumorale	95-100%	82-85%	Lakman et al. Eur Radiol 2017
T	T2	Plage « dark T2 »	79-84%	82-95%	Lakman et al. Eur Radiol 2017
E	Endometrial thickening	Présent			Barral Abdom Imagin 2017 Santos DIR 2015
R	Restricted diffusion	ADC<1.1			



T2

T2

T1

DWI

IV+ Gado

Borders

Enhancement

T2

T1

Endometrial thickening

Restricted diffusion

Régulier

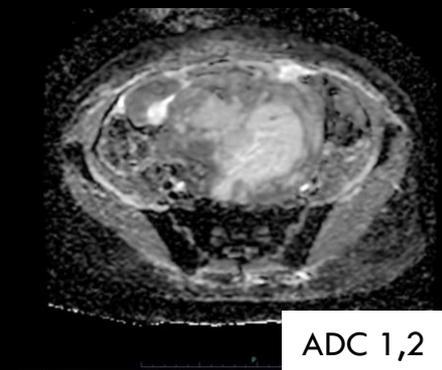
Nécrose

Homogène

Pas d'hémorragie

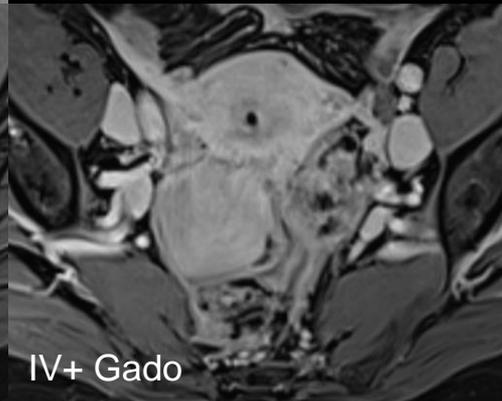
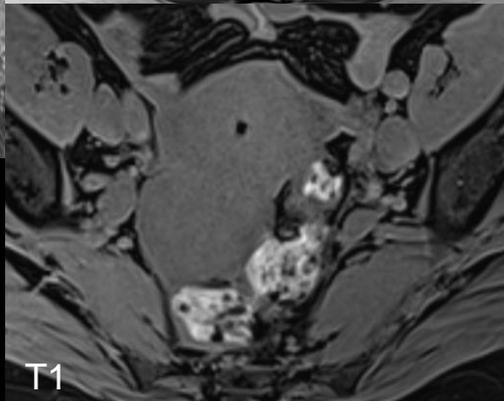
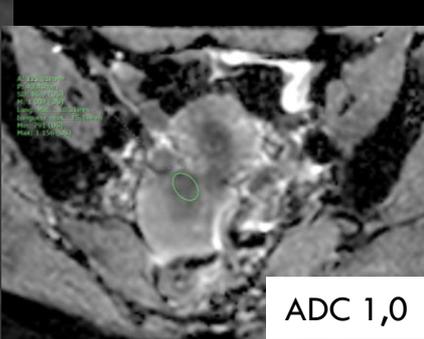
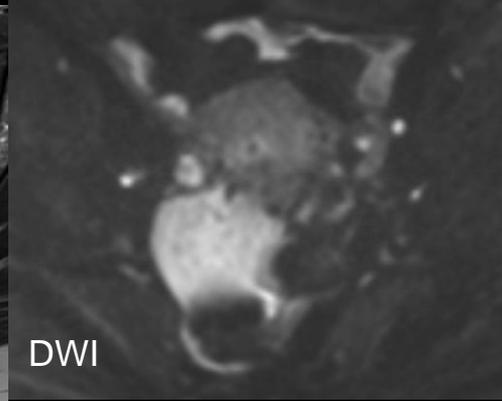
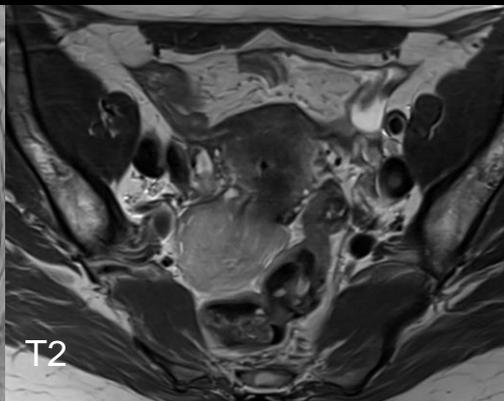
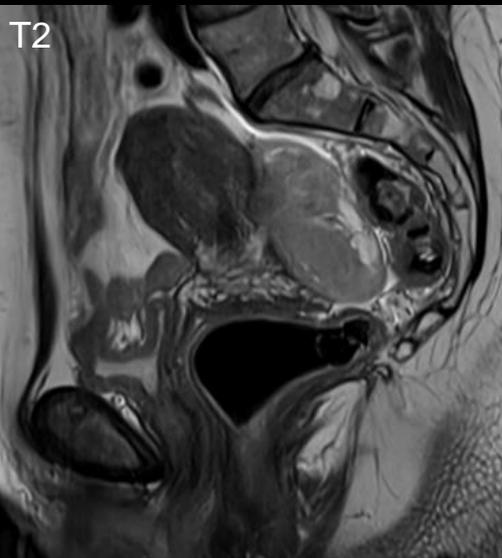
Pas d'épaississement

ADC < 1,1



ADC 1,2

Léiomyosarcome



Borders	Régulier	✓
Enhancement	Nécrose	✗
T2	Homogène	✗
T1	Pas d'hémorragie	✗
Endometrial thickening	Pas d'épaississement	✓
Restricted diffusion	ADC < 1,1	✓

Myome cellulaire bénin

IRM DU SARCOMME UTÉRIN

N=51 (Rétrospective unicentrique)	OR
Intermediate T2W signal *	+ ∞
High b value DW signal *	+ ∞
ADC ≤1,23 ADC > 1,23 Pas de sarcome	25,1
Intra tumor hemorrhage	21,35
Age	20,1
Endometrial thickening	11
T2 W signal heterogeneity	10,2
Menopausal status	9,7
Enhancement heterogeneity	8

Thomassin-Naggara I, et al. Eur Radiol 2013

N=156 (Rétrospective unicentrique)	OR
Intermediate T2W signal *	+ ∞
High b value DW signal > Endometrium *	+ ∞
ADC ≤0,9 *	178
Irregular borders	85,2
Lymph node or peritoneal implants	21
Menopausal status	16.8
Age > 55YO	11,3
Intra tumoral hemorrhage	7
Enhancement heterogeneity	3,58

Abdel Wahab C., Fournier L. et al. Radiology 2021

Tumeur myométriale

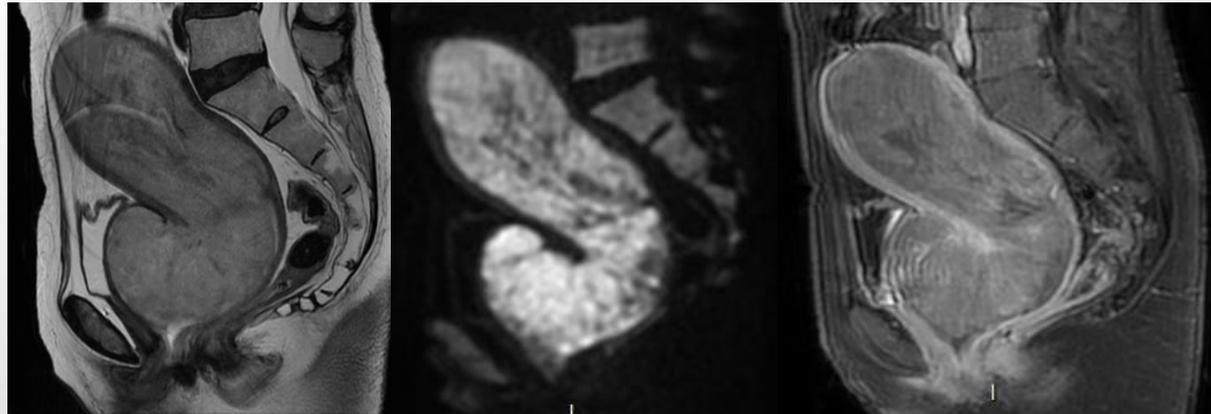


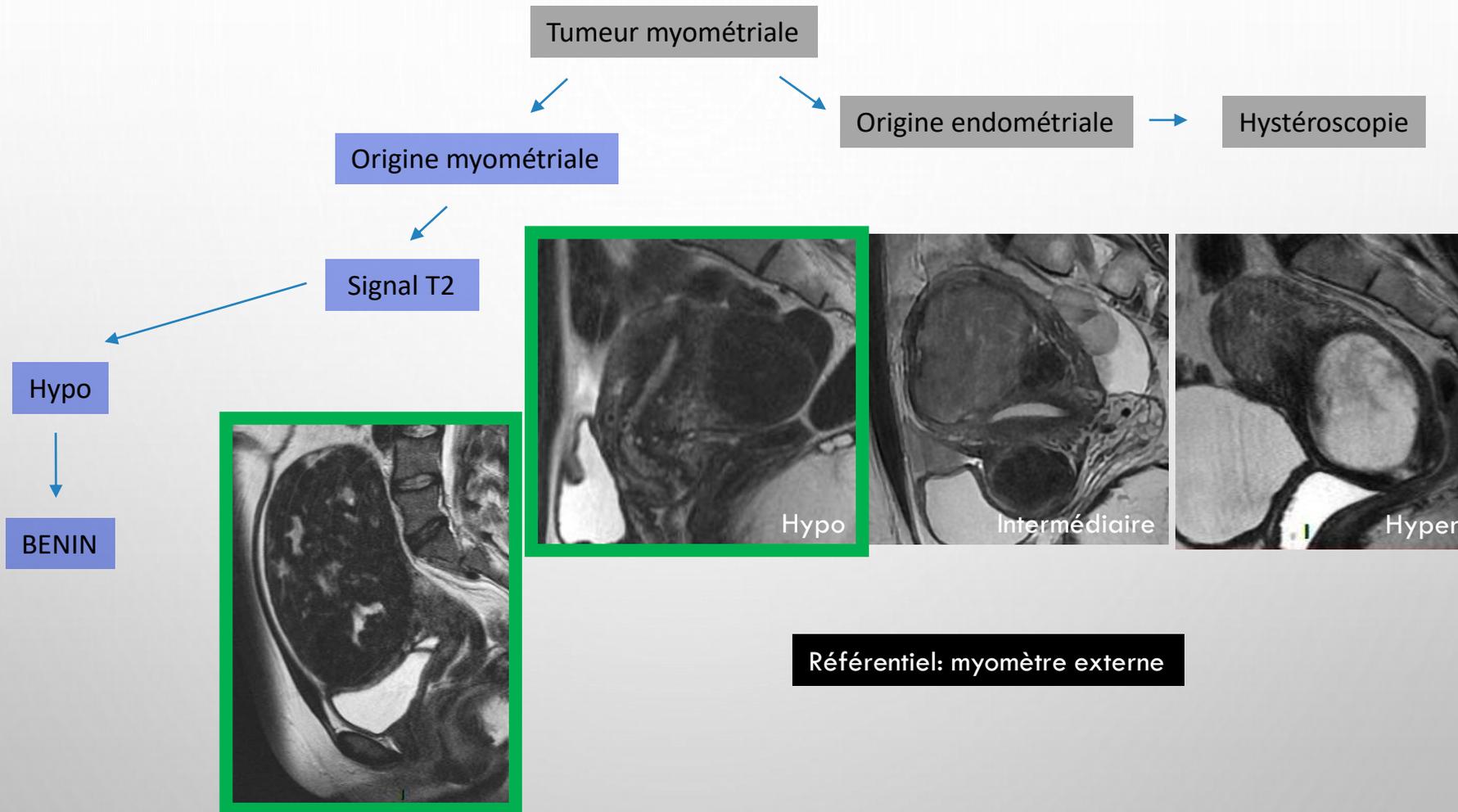
Origine endométriale

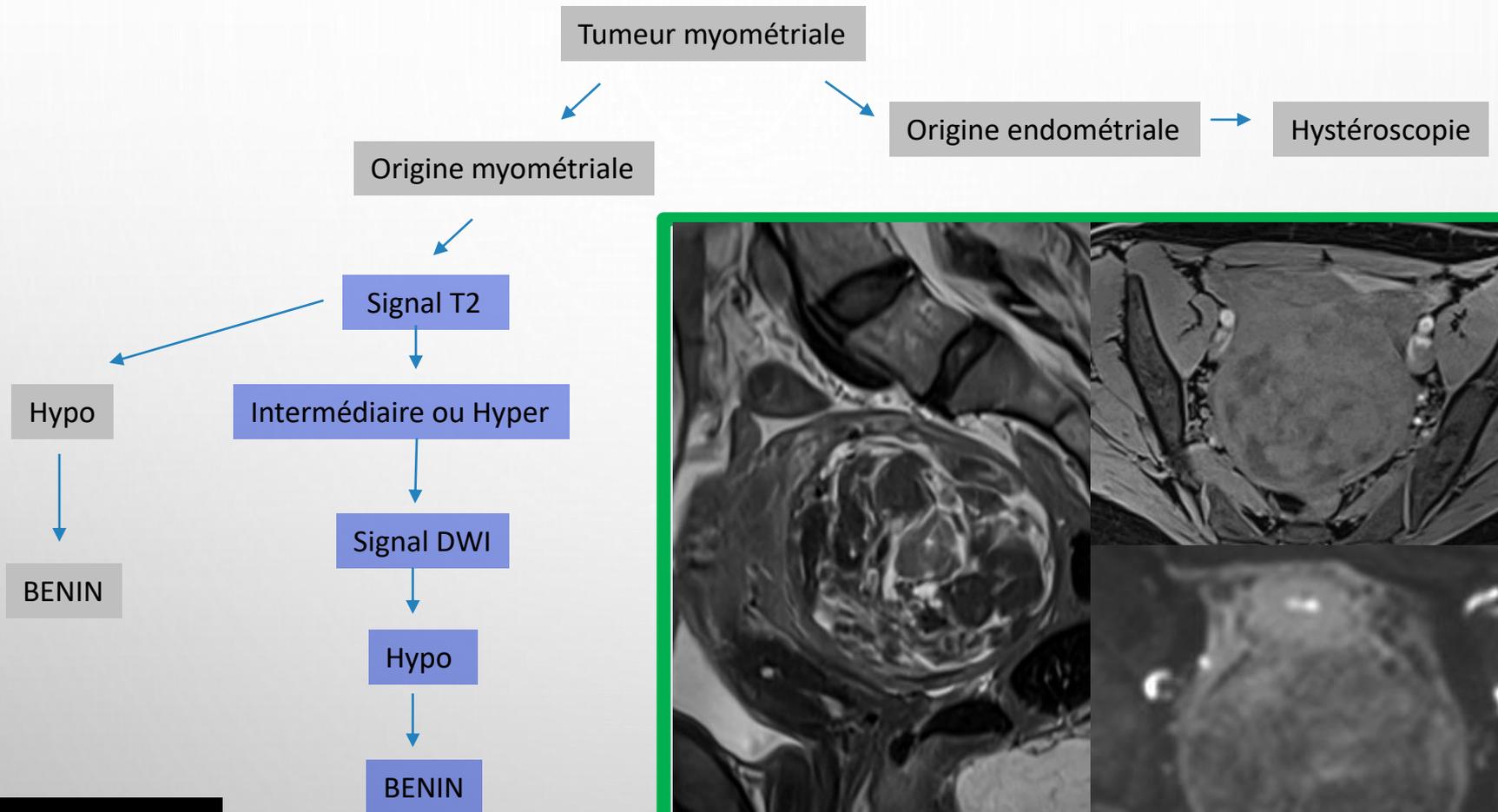


Hysteroscopie

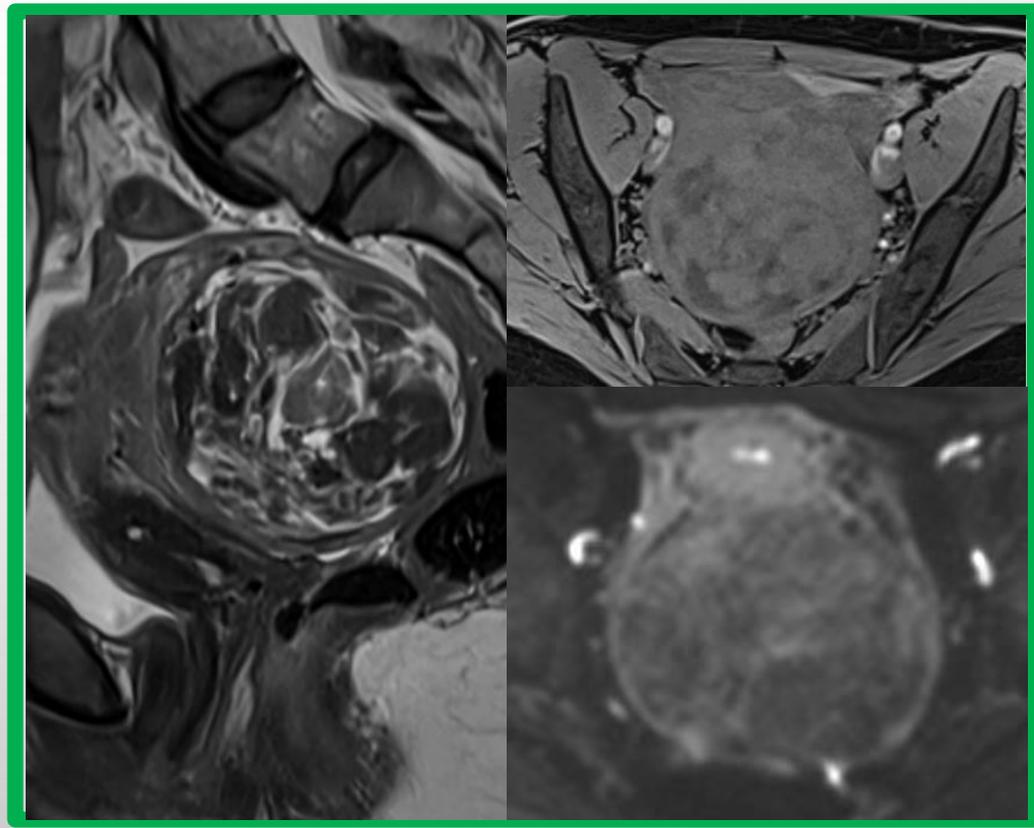
CARCINOSARCOME



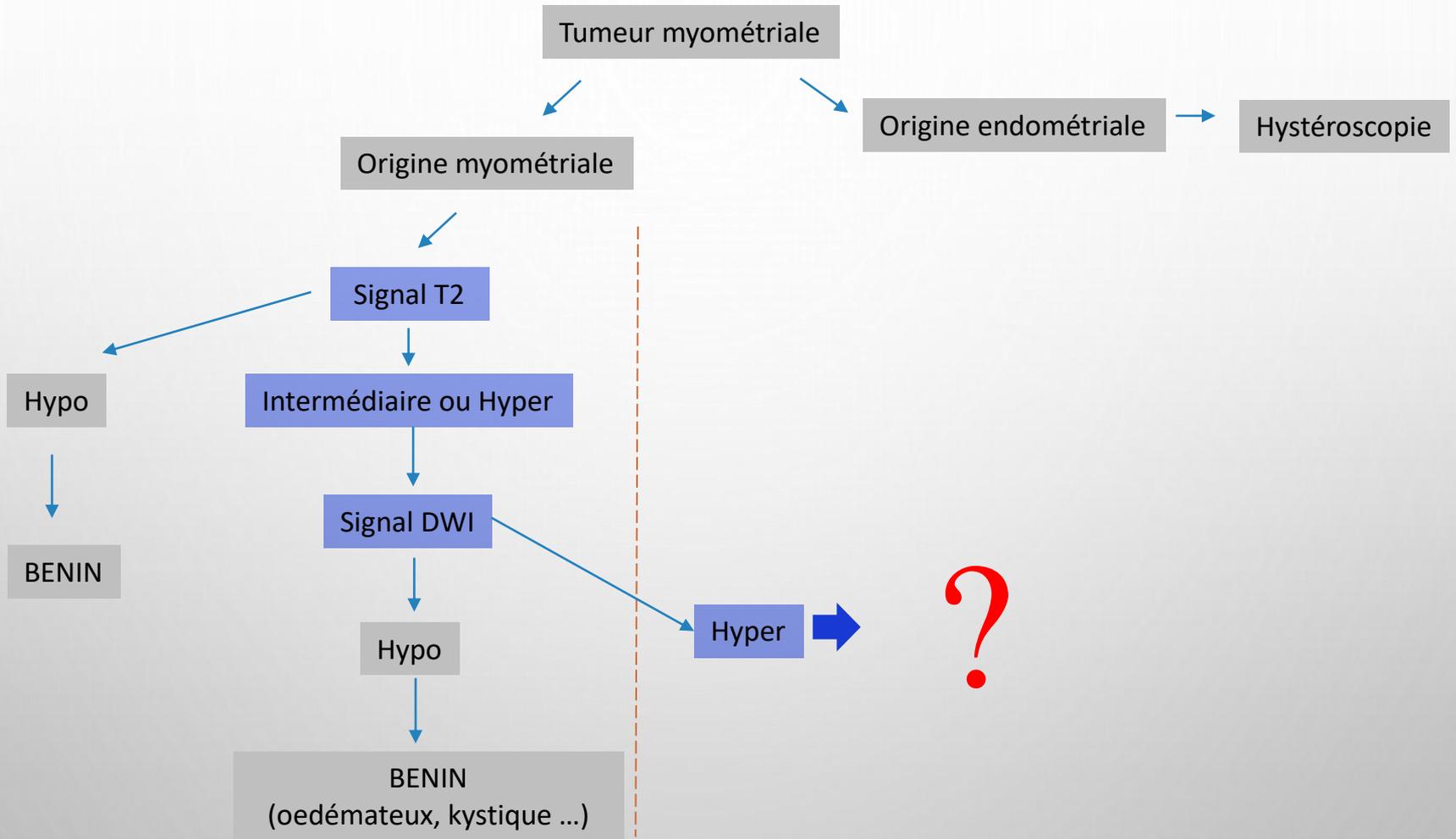




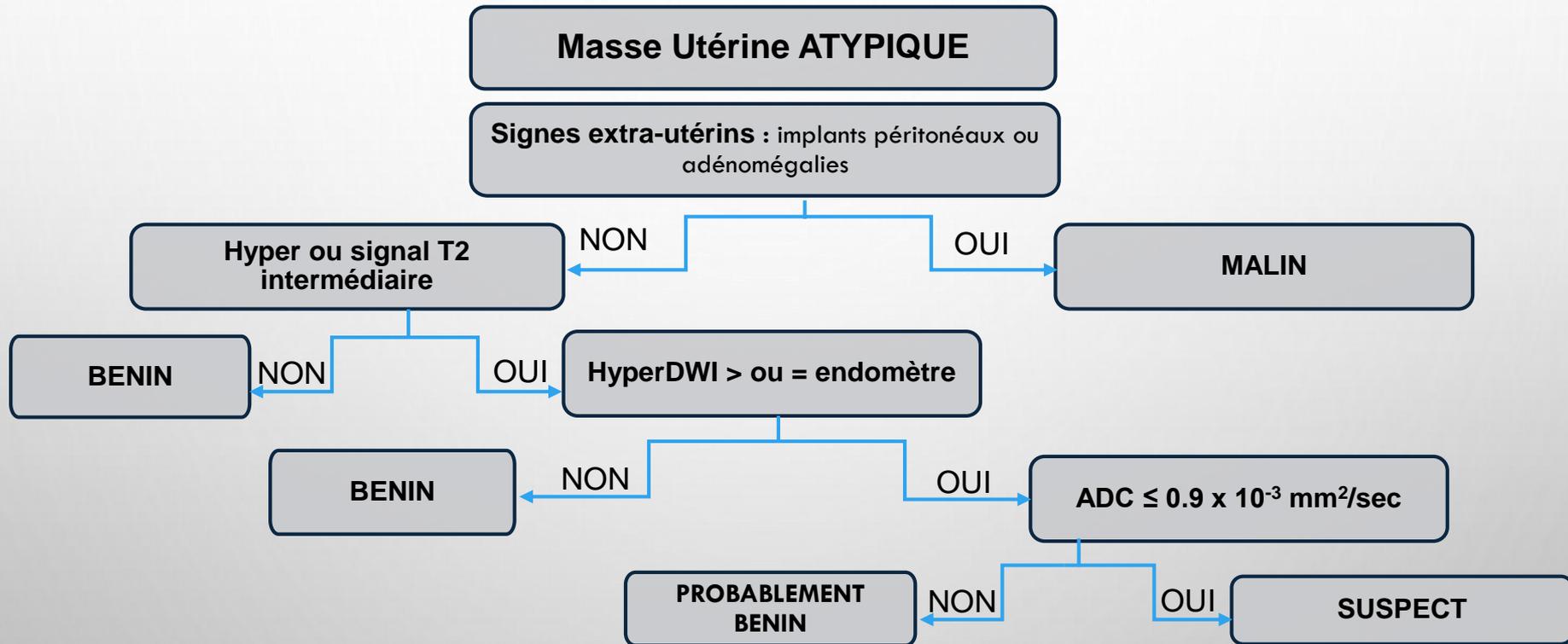
NE PAS UTILISER L'ADC



Myome bénin

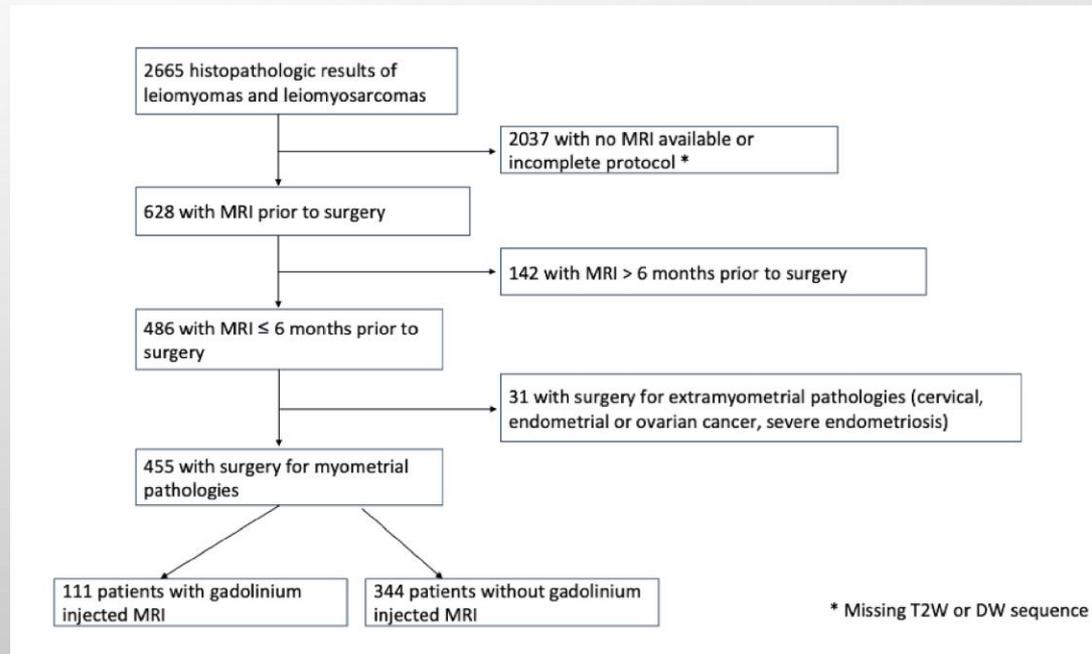


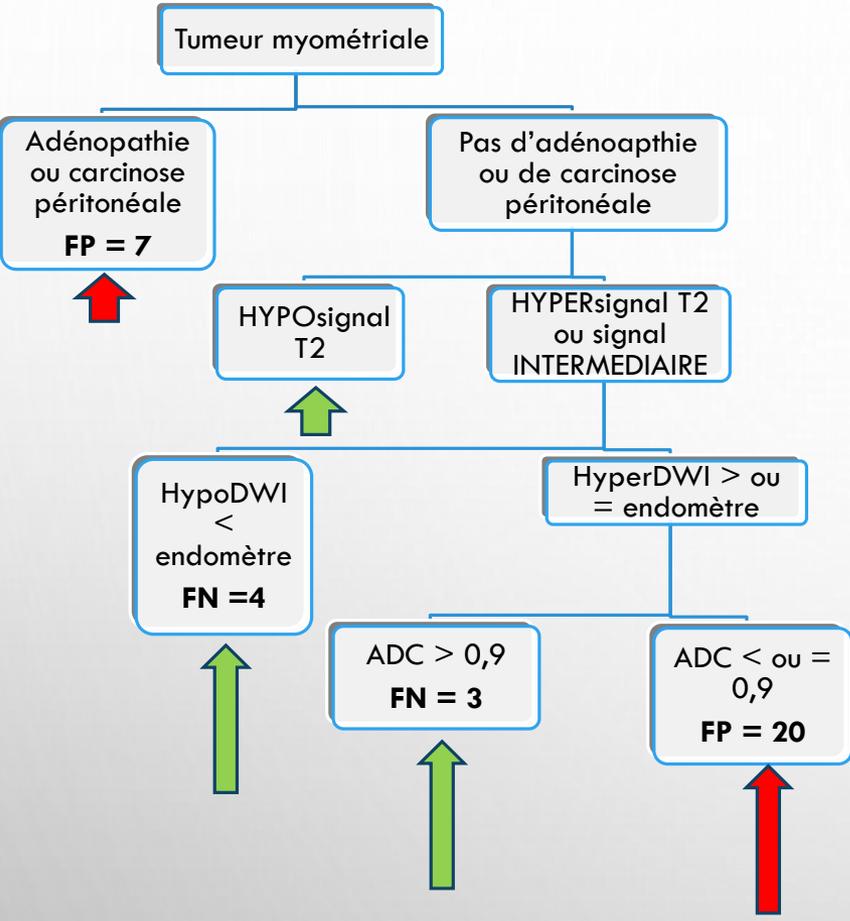
CONSENSUS D'EXPERT : ALGORITHME DE RÉFÉRENCE



VALIDATION EXTERNE

- Étude rétrospective, deux centres, cohorte observationnelle (n=455)
- 2018-2023
- Prévalence : 18/455 (3,9%)
 - 15 LMS
 - 1 UUS
 - 2 STUMP





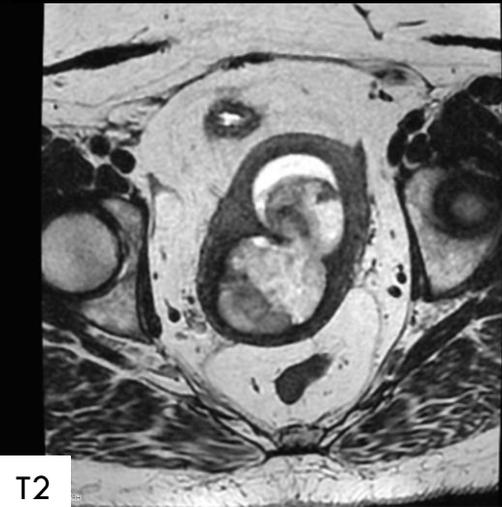
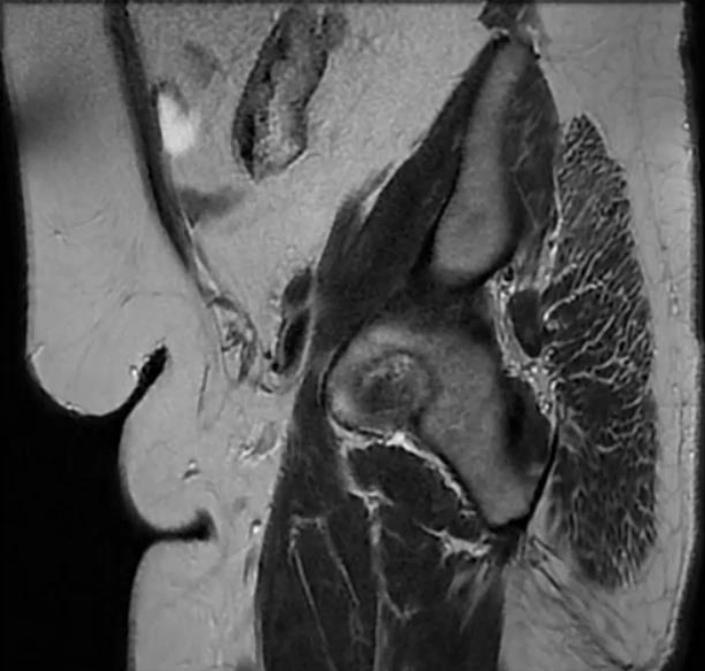
Consensus algorithm
Hindman et al. Radiology 2023

N=455	Original algorithm
Sensitivity (%)	61.1% (11/18)
Specificity (%)	93.6% (409/437)
PPV (%)	28,9% (11/38)
NPV (%)	98,3% (409/416)
Accuracy (%)	92,5% (421/455)
True positive	11
False positive	27
True negative	410
False negative	7
LR+ (Se/1-Spe)	8.71
LR- (1-Se/Spe)	0.42

Principale limite :
Taux de faux positif

5 léiomyosarcomes
manqués

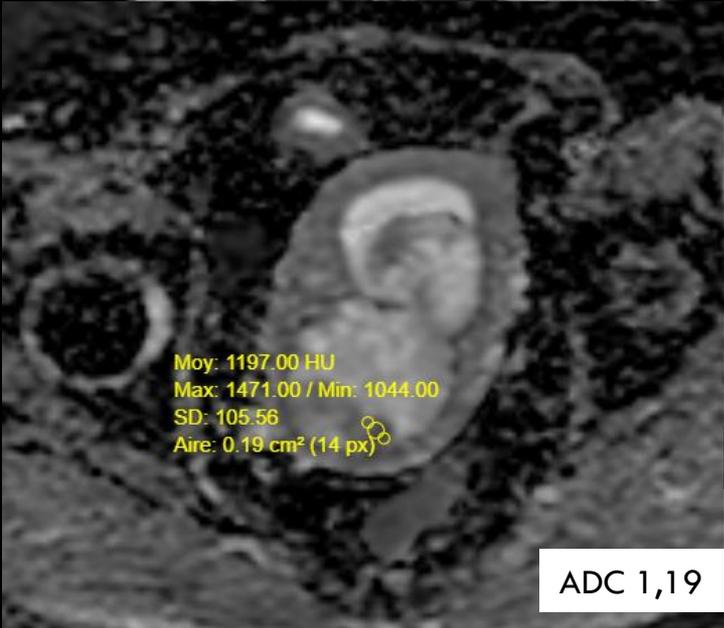
Patiente de 65 ans, bilan d'une masse utérine



T2



T1

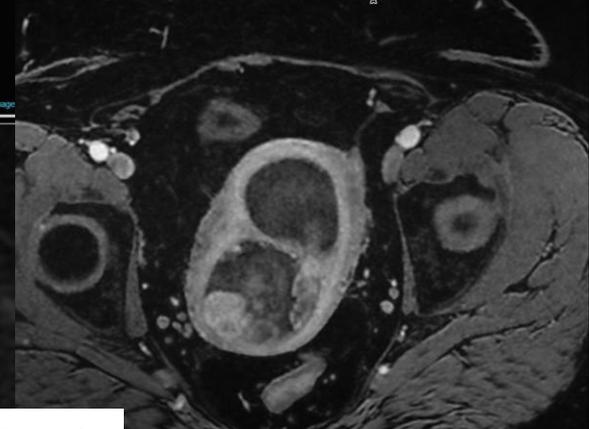


Moy: 1197.00 HU
Max: 1471.00 / Min: 1044.00
SD: 105.56
Aire: 0.19 cm² (14 px)

ADC 1,19



DWI

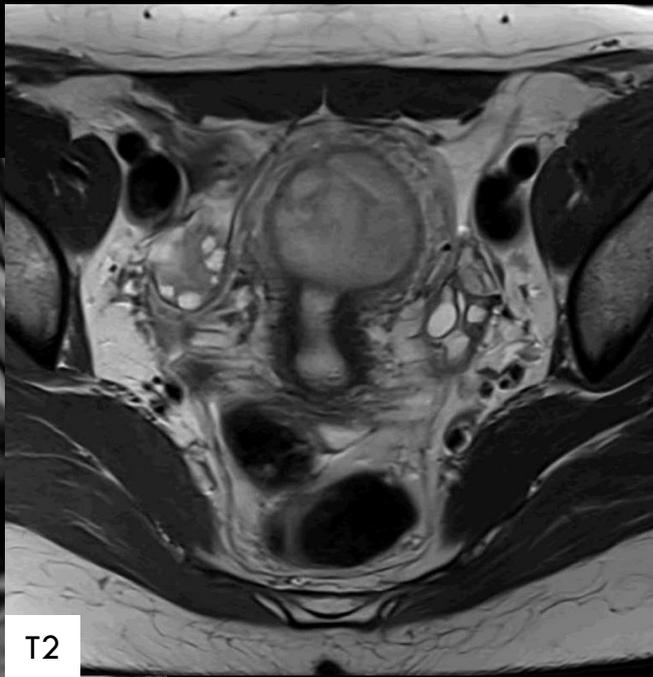
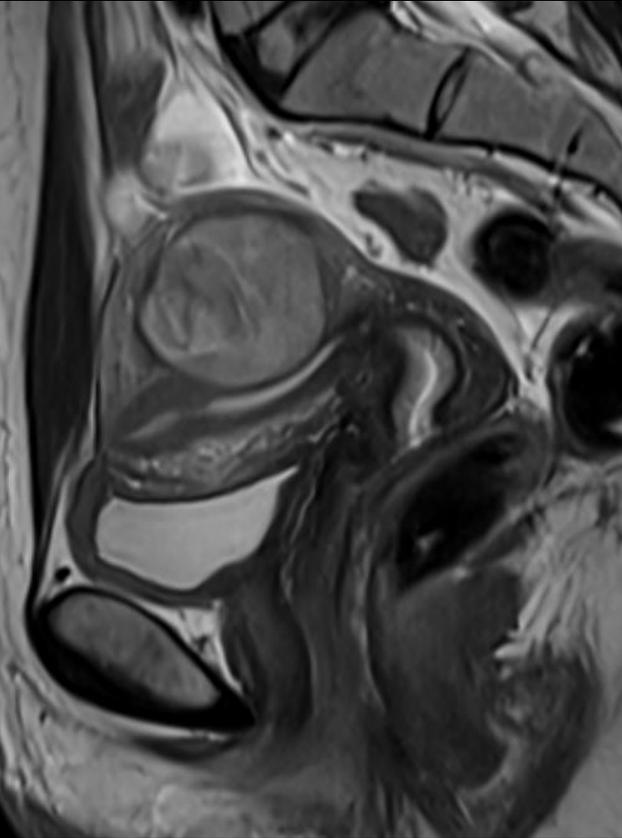


T1 gado

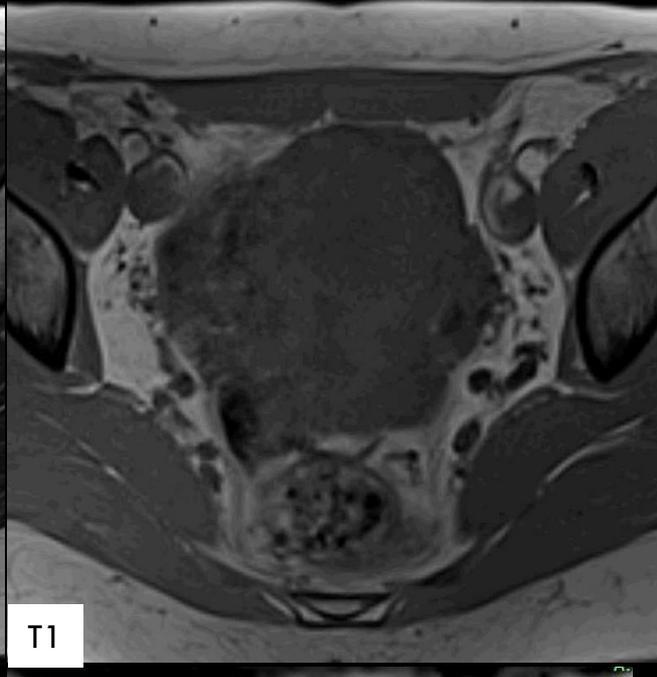


Léiomyosarcome myxoïde = FN

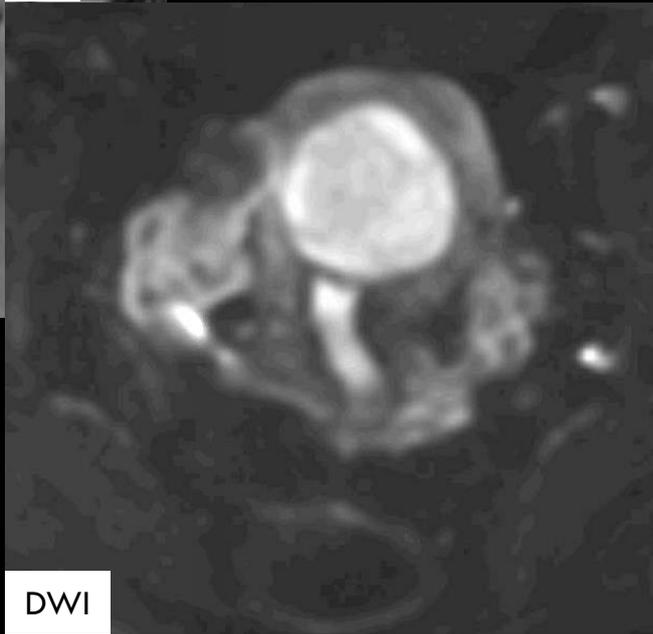
Patiente de 33 ans, bilan d'une masse utérine, désir de grossesse



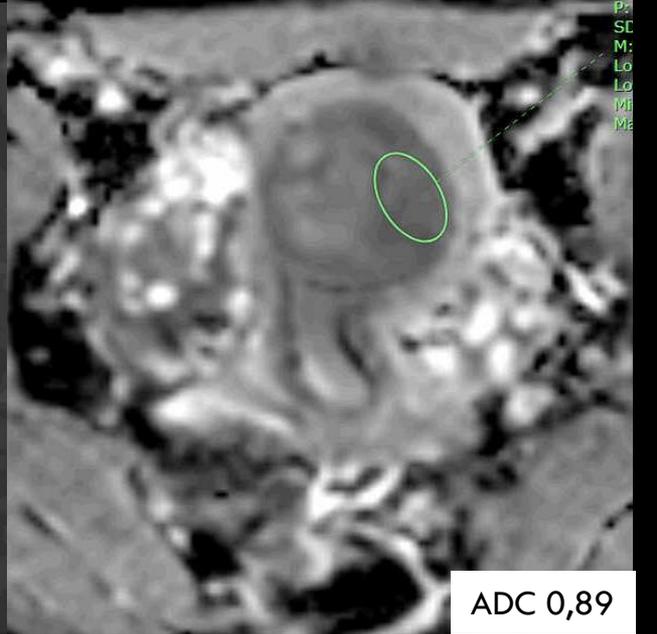
T2



T1



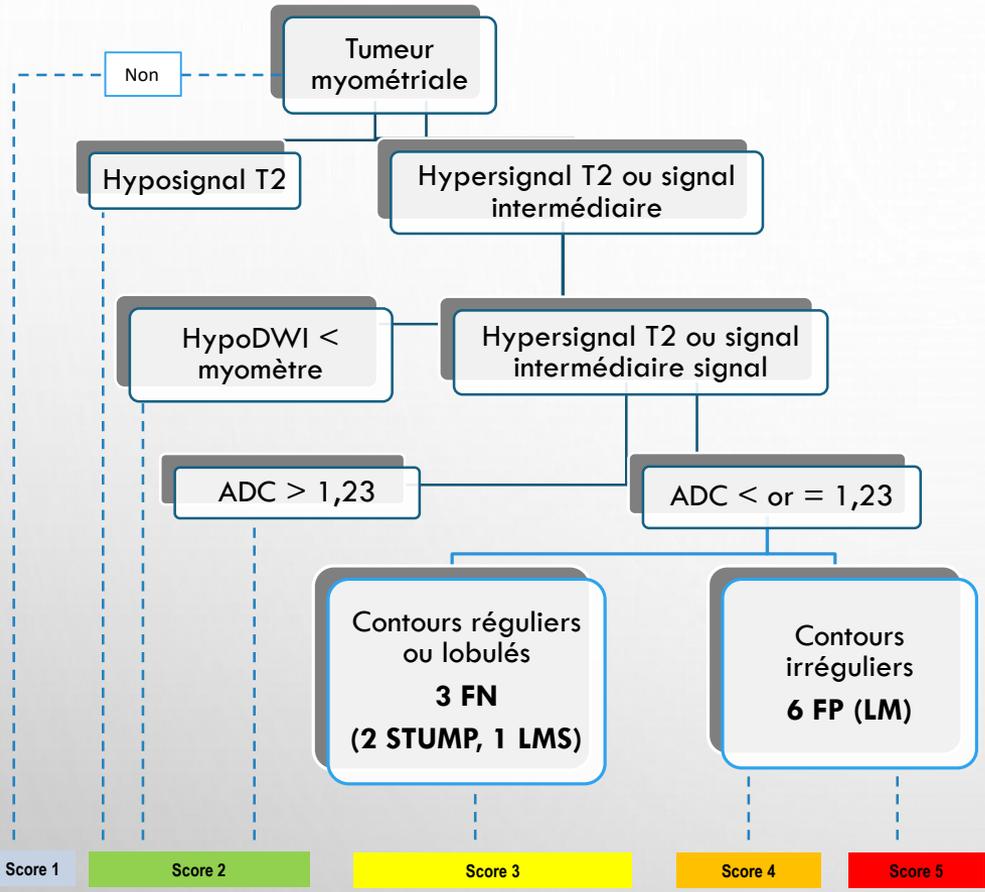
DWI



ADC 0,89

Myome cellulaire = FP

CP
PT
ST
M:
Lo
Lo
M
Me



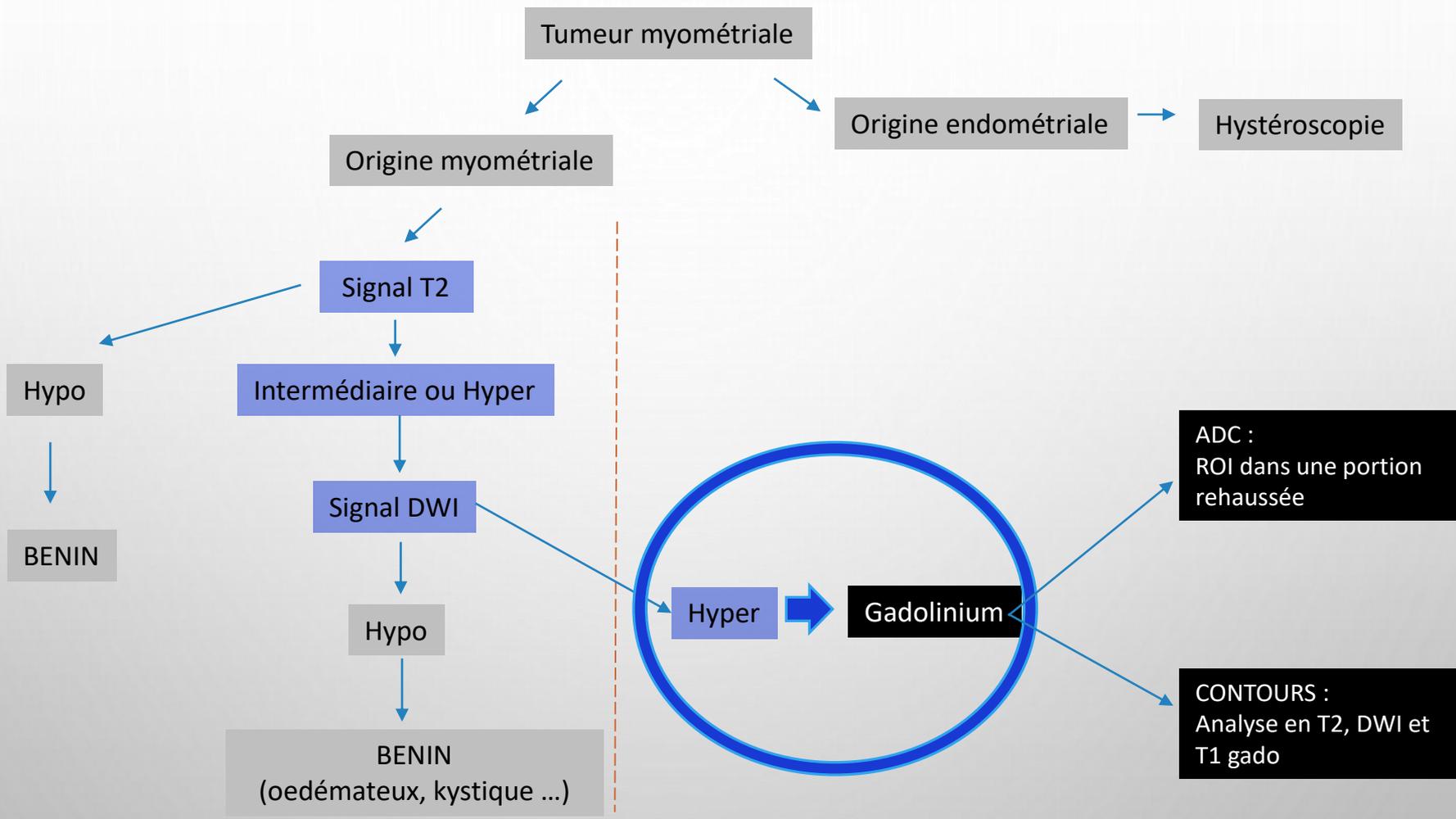
	ALGORITHMME ORIGINAL	ALGORITHMME MODIFIE
Sensitivity (%)	61.1% (11/18)	83.3% (15/18)
Specificity (%)	93.6% (409/437)	98.6% (431/437)
PPV (%)	28,9% (11/38)	71,4% (15/21)
NPV (%)	98,3% (409/416)	99,3 % (430/433)
Accuracy (%)	92,5% (421/455)	98% (446/455)
True positive	11	15
False positive	27	6
True negative	410	431
False negative	7	3
LR+ (Se/1-Spe)	8.71	41.5
LR- (1-Se/Spe)	0.42	0.17

		MODIFIE		
		Correct	Misclassified	Total
ORIGINAL	Correct	413	7	420
	Misclassified	32	3	35
	Total	445	10	455

P = 0.0001
Différence = 5.49%

NOUVEAU SCORE

SCORE	DESCRIPTION	VPP
SCORE 1	Pas de tumeur myométriale	-
SCORE 2	Hyposignal T2 homogène Hyposignal DWI homogène (noir comme l'urine) Signal T2 intermédiaire ou hypersignal ET hypersignal DWI ET ADC > 1,23	0% (0/350)
SCORE 3	Signal T2 intermédiaire ou hypersignal ET hypersignal DWI ET ADC < ou = 1,23 ET contours réguliers ou lobulés	3,6% (3/82)
SCORE 4	Signal T2 intermédiaire ou hypersignal ET hypersignal DWI ET ADC < ou = 1,23 ET contours irréguliers chez la patiente non ménopausée	44,4% (4/9)
SCORE 5	Signal T2 intermédiaire ou hypersignal ET hypersignal DWI ET ADC < ou = 1,23 ET contours irréguliers chez la femme ménopausée	91,6% (11/12)

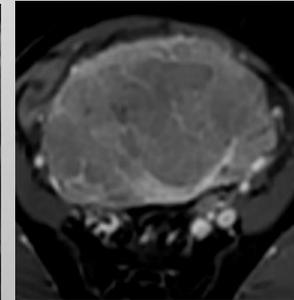
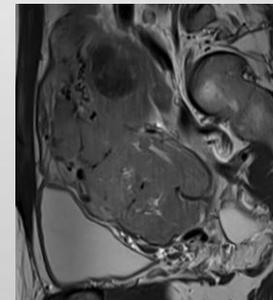
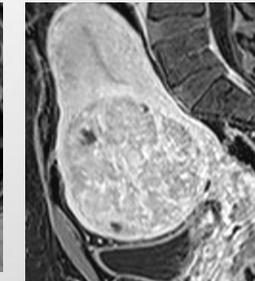
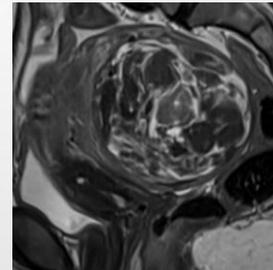
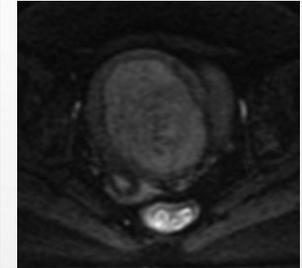
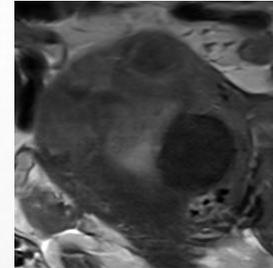


CONTOURS

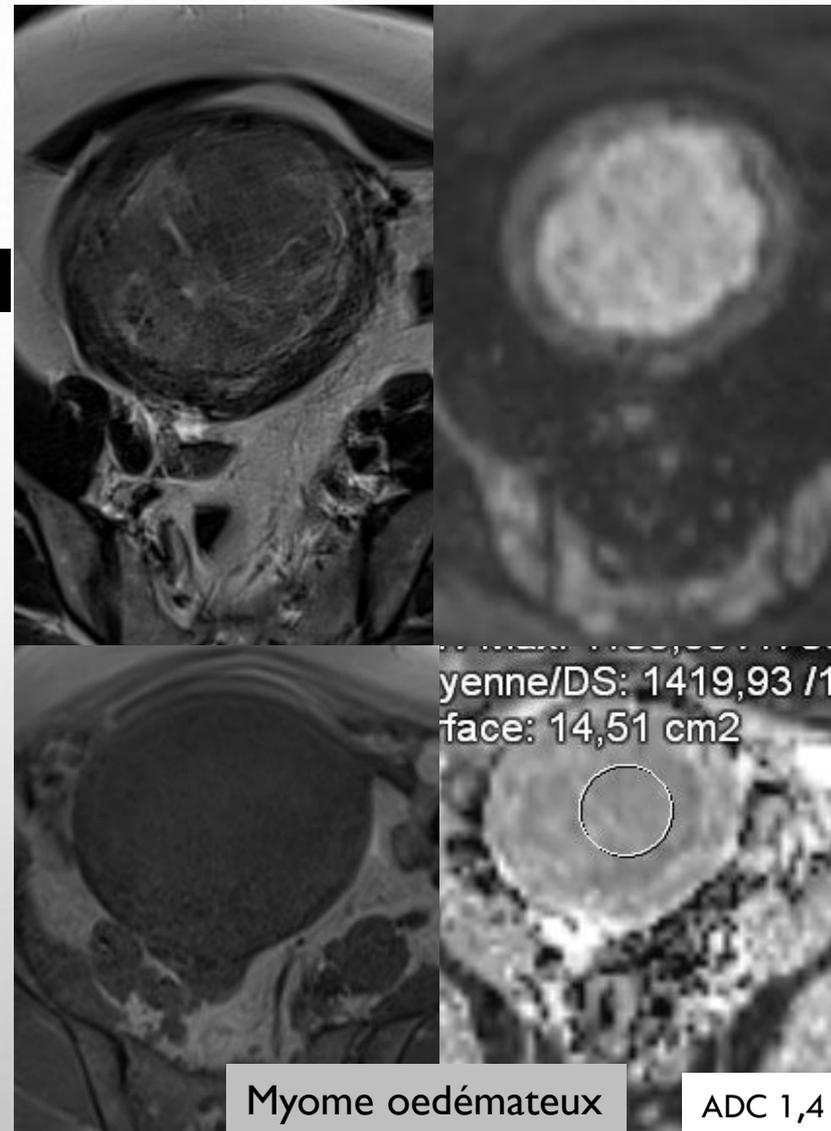
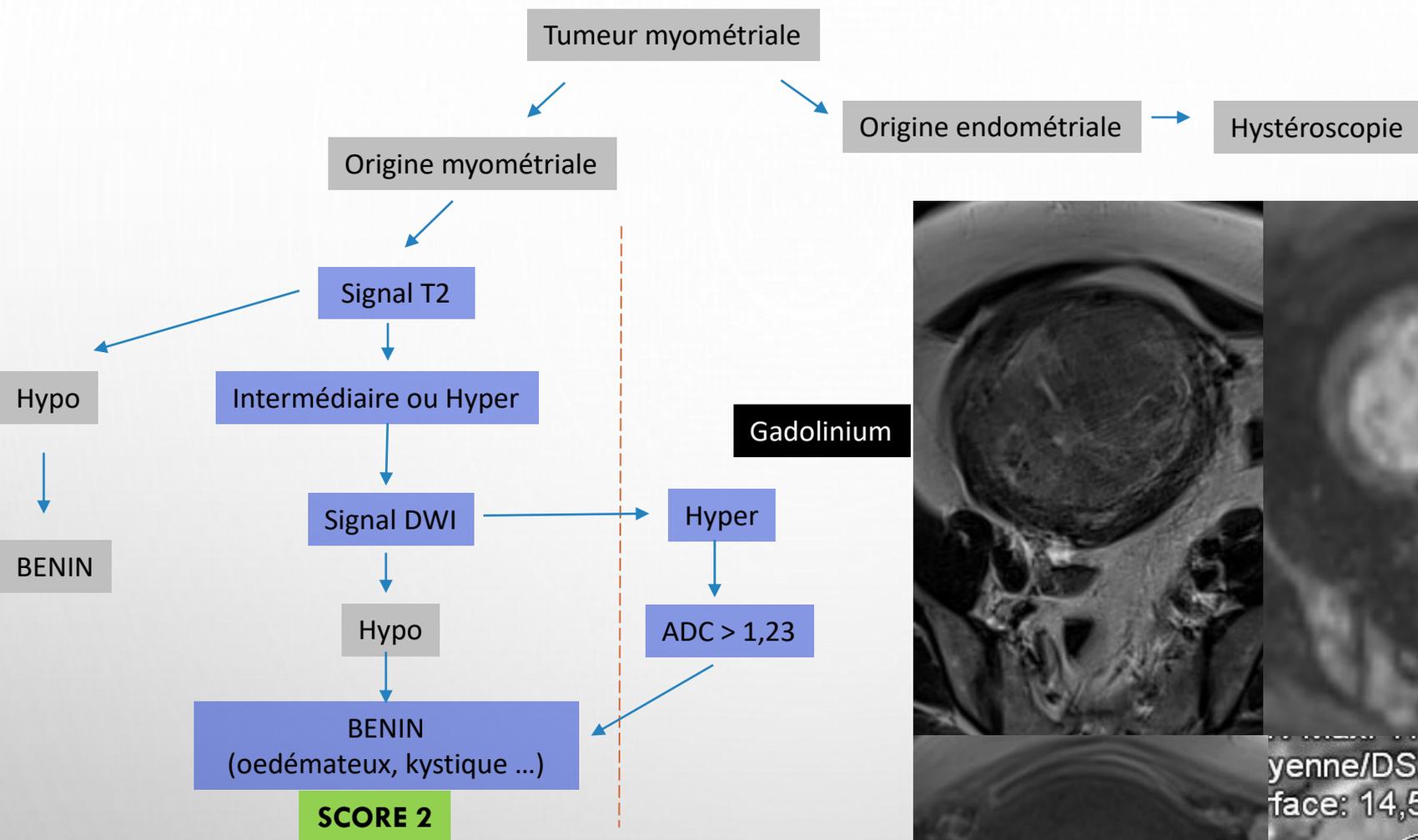
- LISSES 
 - BORD ININTERROMPU, BIEN DÉFINI ET CURVILIGNE, FORME SPHÉRIQUE OU ELLIPTIQUE SUR TOUTE LA MASSE

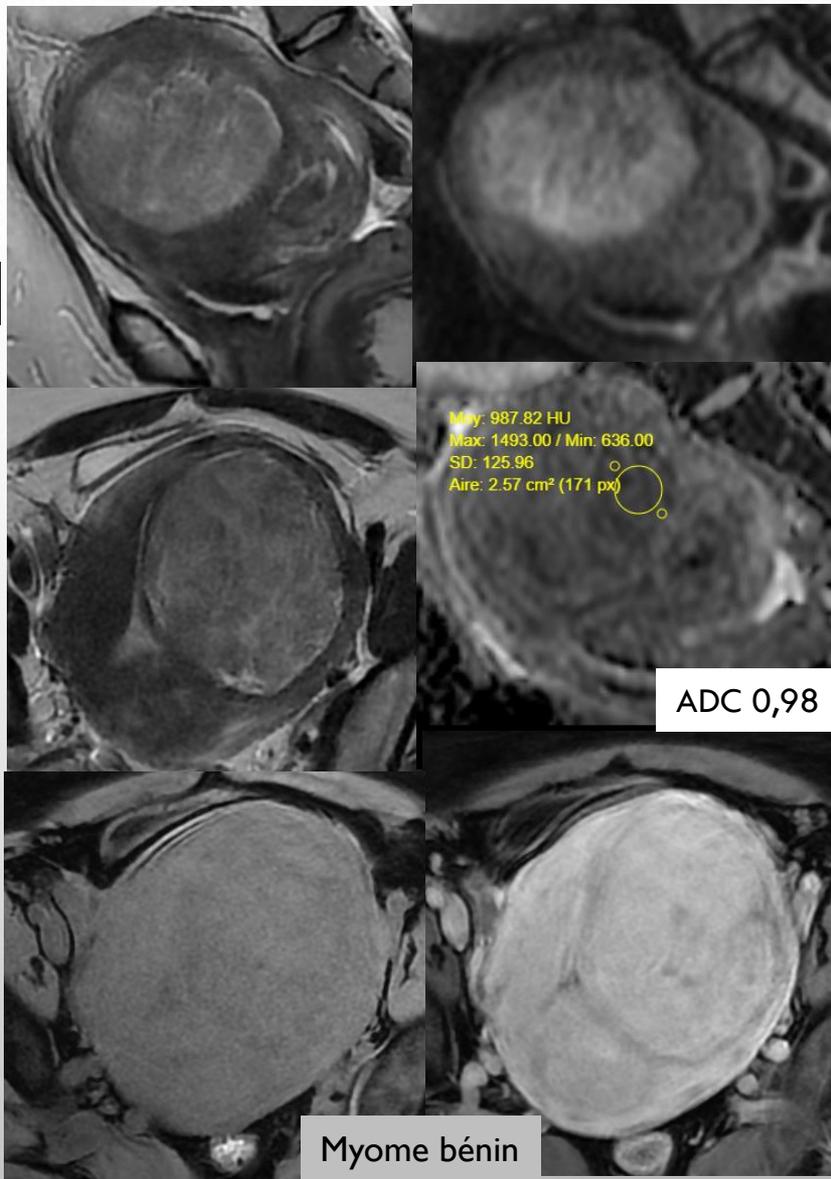
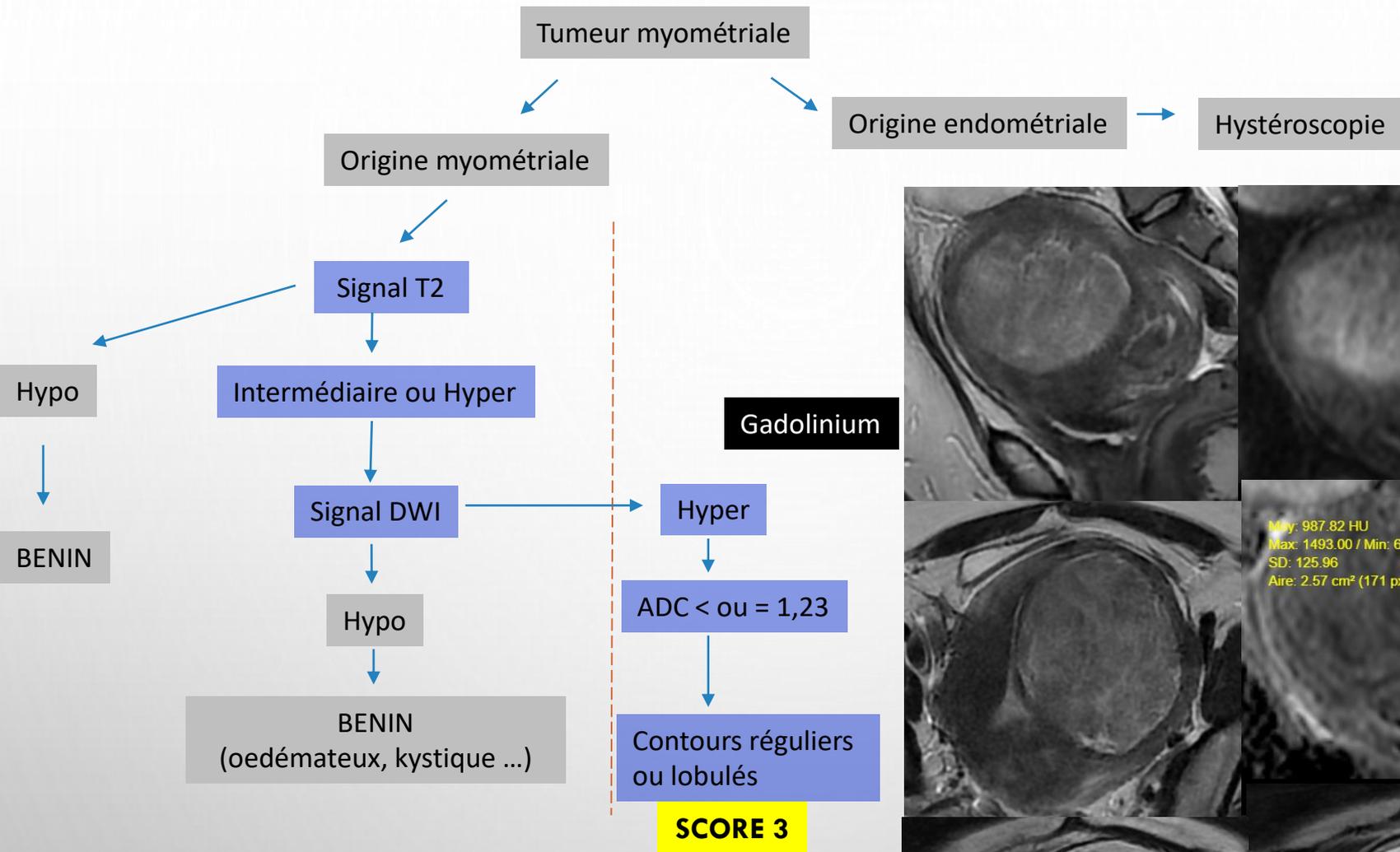
- LOBULÉS 
 - BORDURE ONDULÉE BIEN DÉFINIE QUI N'ENVAHIT PAS LE PARENCHYME ADJACENT

- IRRÉGULIERS 
 - BORDS ANGULAIRES ABRUPTS, AVEC OU SANS ENVAHISSEMENT DU PARENCHYME ADJACENT, SUR UNE PARTIE OU TOUTE LA MASSE

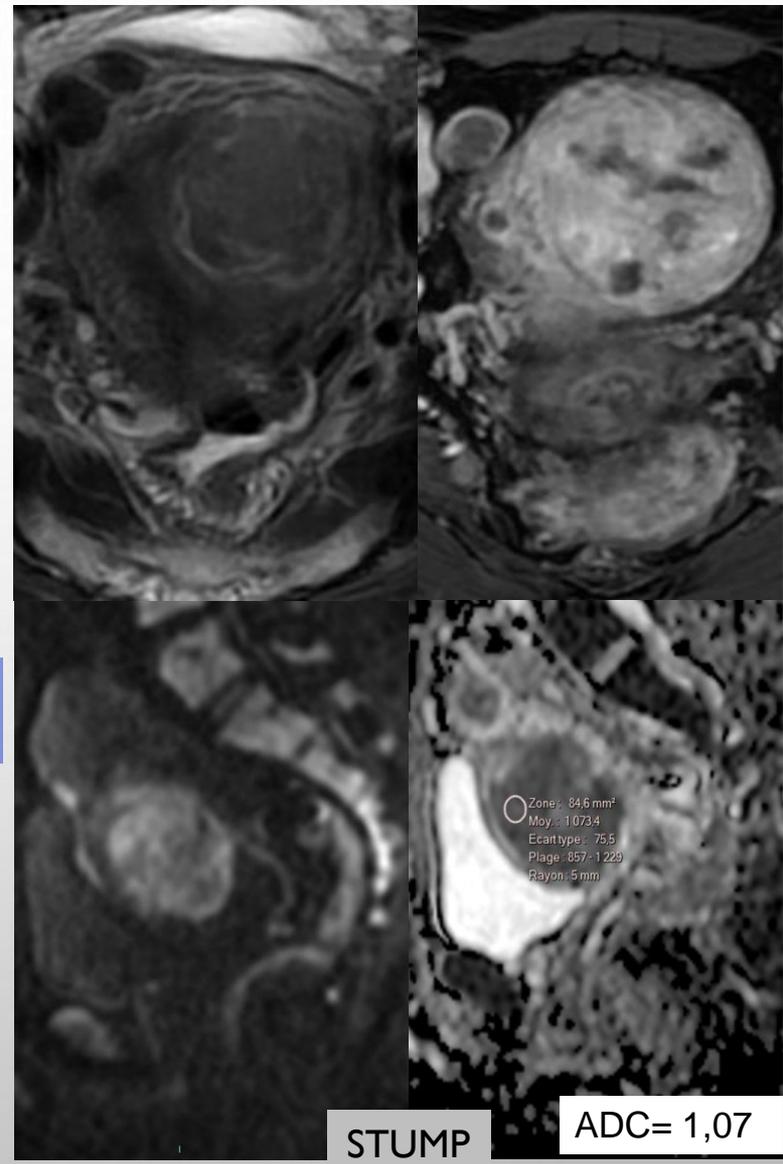
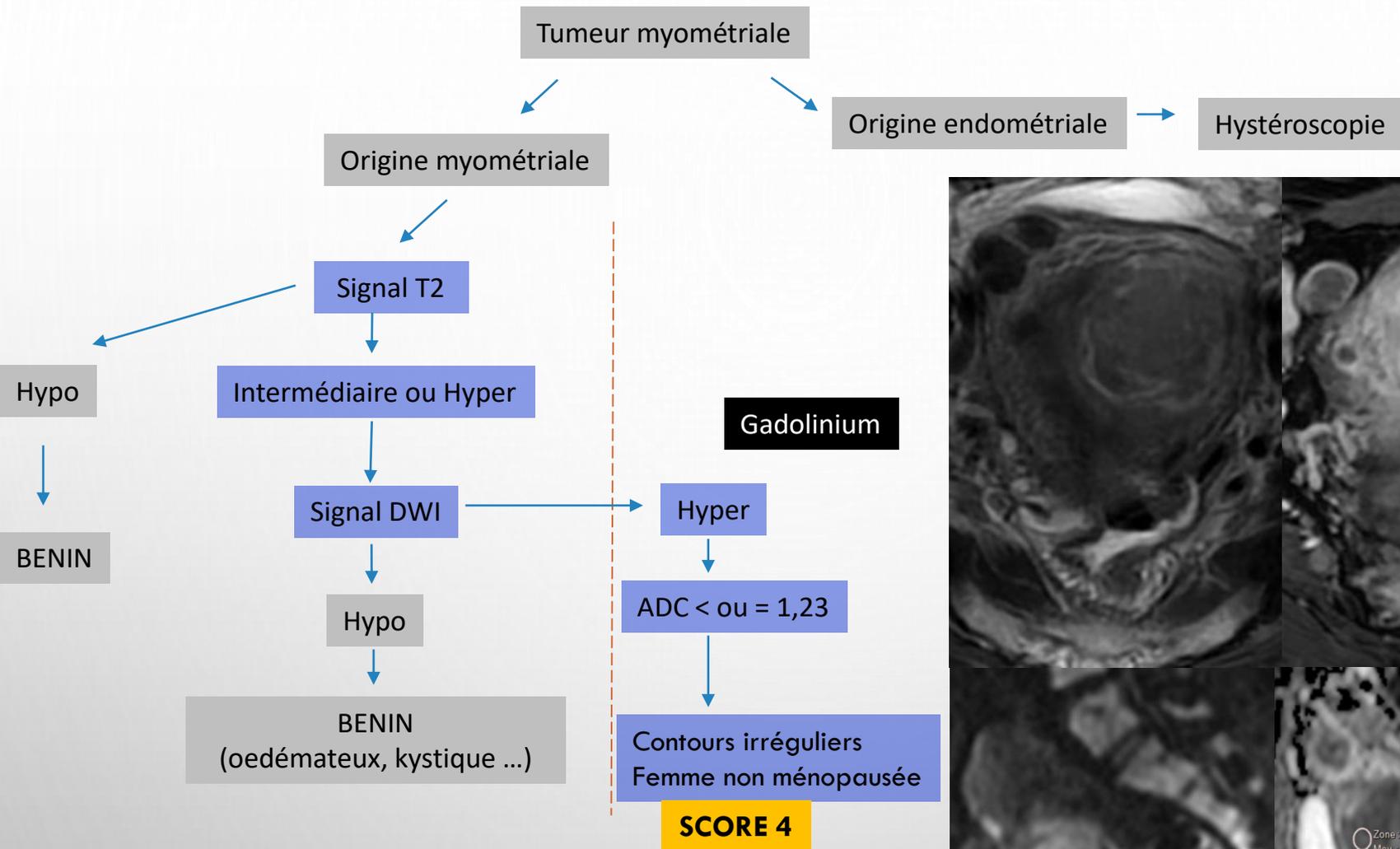


ANALYSE EN T2, DWI ET T1 GADOLINIUM





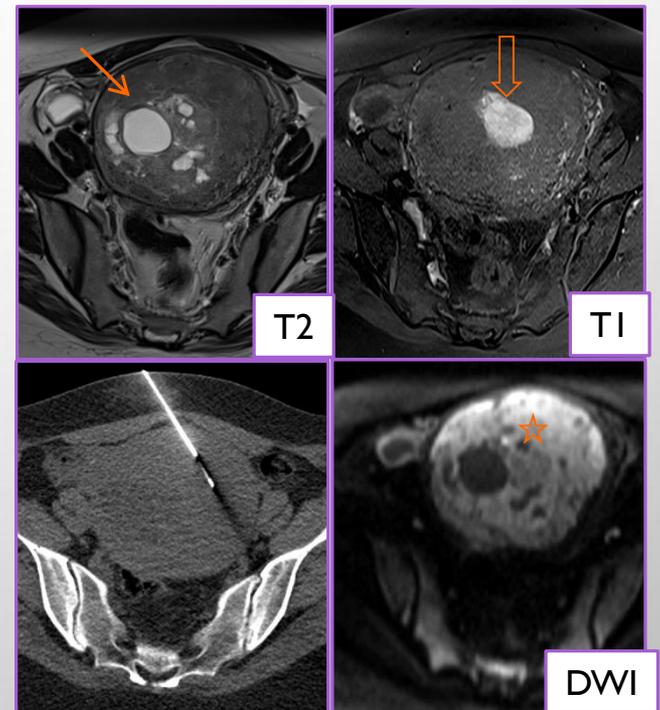
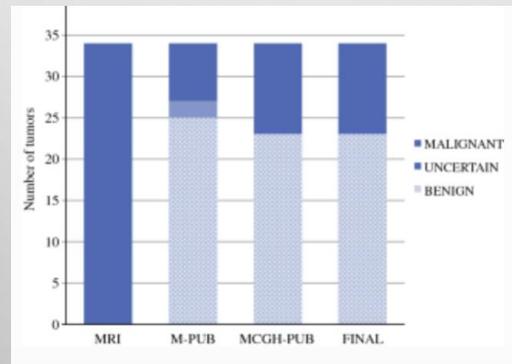
Myome bénin



STUMP ADC = 1,07

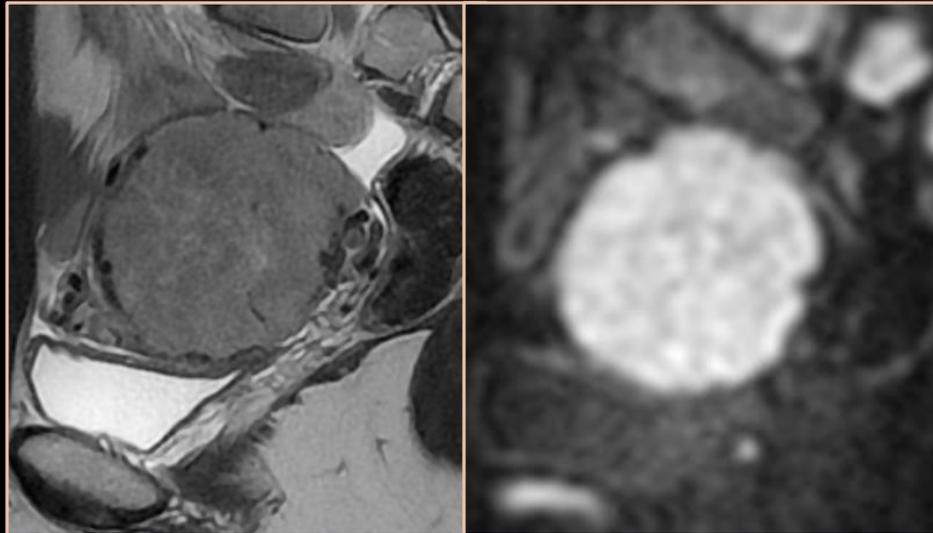
BIOPSIE PERCUTANEE

- SOUS ÉCHOGRAPHIE OU SOUS SCANNER
- ANALYSE HISTOLOGIQUE AVEC ANALYSE GÉNOMIQUE
- PAS DE DISSÉMINATION À LA CHIRURGIE (11 SARCOMES)
- PAS DE MALIGNITÉ APRÈS 12 MOIS DE SUIVIS (23 MYOMES)



CAS CLINIQUE 2 / CAS CLINIQUE 3

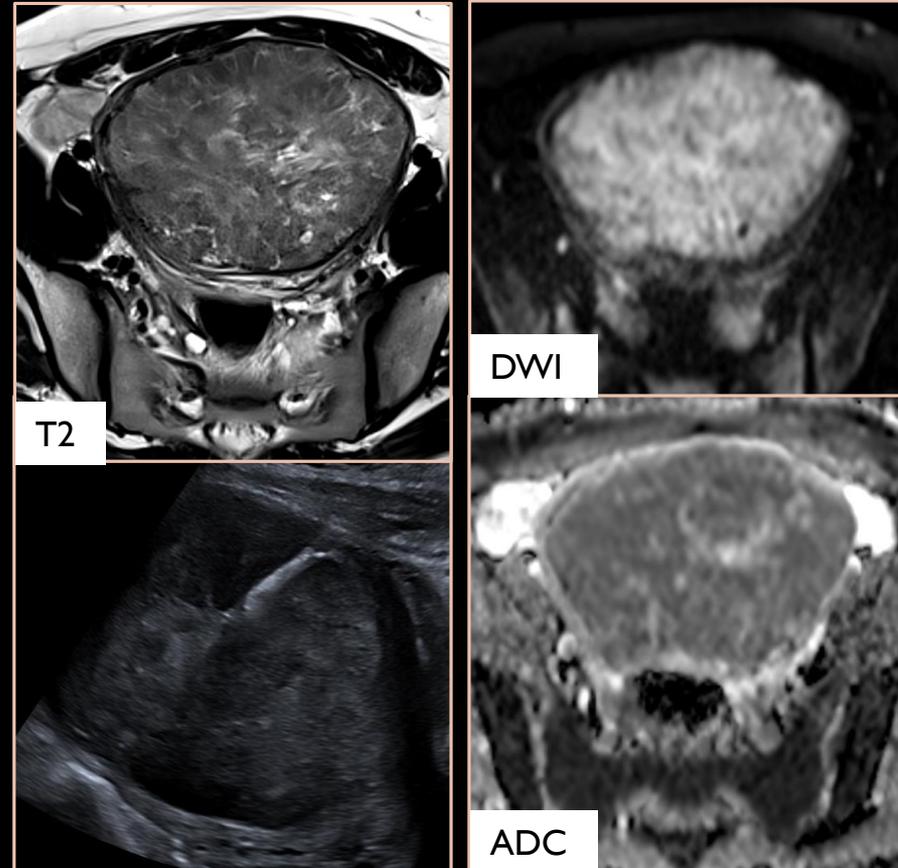
30 ans, infertilité, $ADC = 0,865 \cdot 10^{-3}$



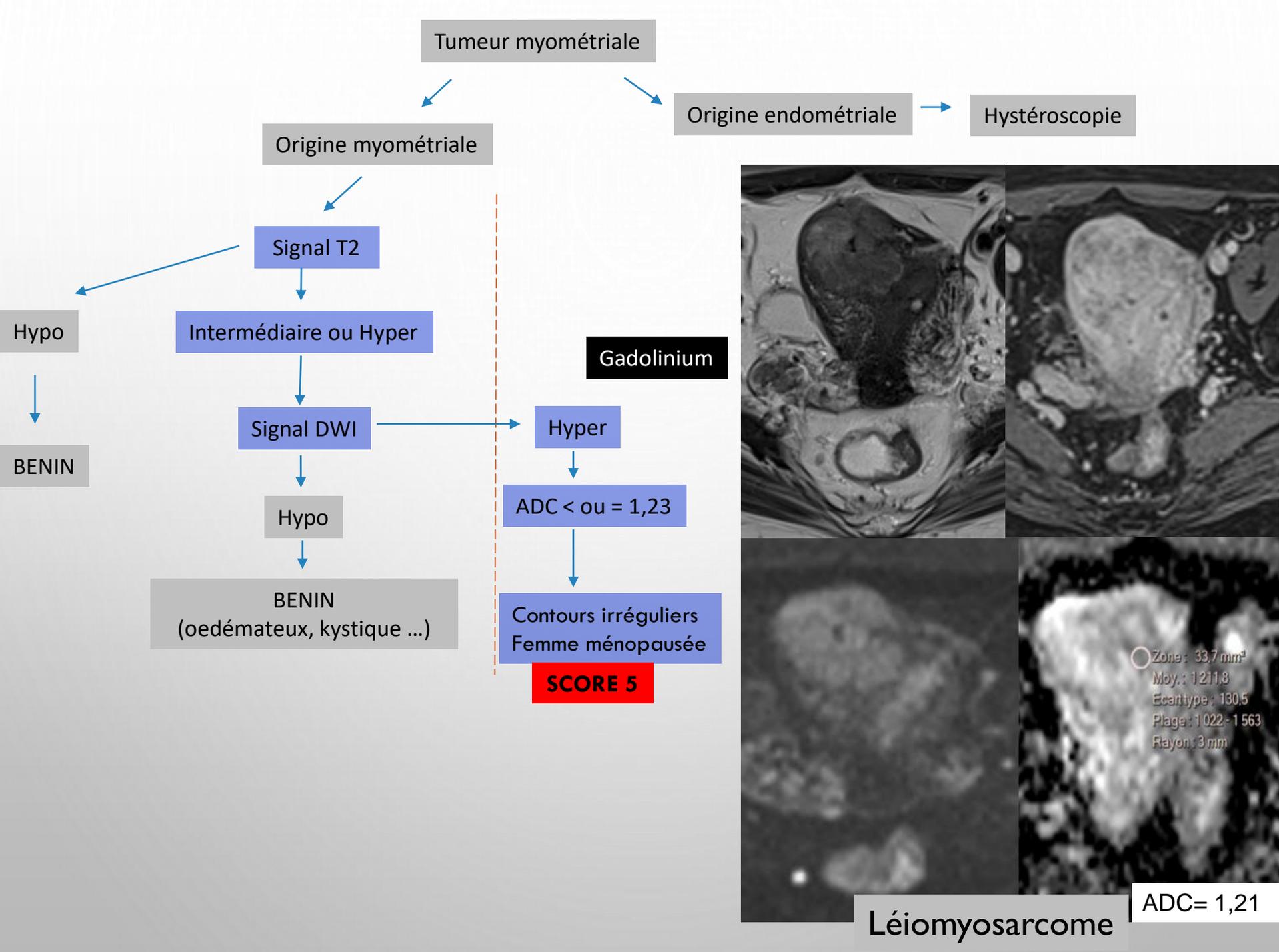
Myomectomie : léiomyome FH-déficient

Smadja et al. Ann Surg Oncol 2023

30 ans, infertilité, $ADC = 0,917 \cdot 10^{-3}$



Myomectomie : léiomyome cellulaire
Pas de signe de malignité à 3 ans



CONCLUSION

- ANALYSE **PAS À PAS**
- **ADC ISOLÉ** = ABSENCE DE VALEUR +++
- **HYPOSIGNAL T2 = BÉNIN**
- **HYPOSIGNAL DWI = BÉNIN**
- INJECTION NON SYSTÉMATIQUE (EN CAS DE BESOIN DE MESURE DE L'ADC ++)
- $ADC \geq 1.3 = \text{BÉNIN} / ADC \leq 0.9 = \text{SUSPECT}$
- AUTRES CRITÈRES (CONTOURS IRRÉGULIERS, HÉTÉROGÉNÉITÉ) À COMBINER POUR UNE PRÉCISION DIAGNOSTIC DE 90%
- EMERGENCE DE LA BIOPSIE PERCUTANÉE AVEC ANALYSE MOLÉCULAIRE +++
- VALIDATION EXTERNE NÉCESSAIRE

SCORE	VPP	Conduite à Tenir
SCORE 1	-	
SCORE 2	0% (0/350)	-
SCORE 3	3,6% (3/82)	Suivi rapproché (3 mois)
SCORE 4	44,4% (4/9)	Biopsie percutanée
SCORE 5	91,6% (11/12)	Biopsie percutanée si chirurgie non radicale

Zloty et Thomassin-Naggara EJR 2025



Ateliers SIFEM : Marie Florin
Jeudi 12/06 à 16 H