産婦人科領域で知っていると役に立つCT、MRIの基礎知識

防衛医科大学校　放射線医学講座

新本　弘

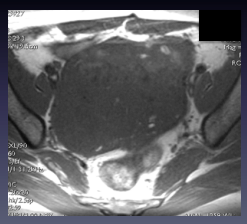
内容

- MRI信号強度の基礎知識
- 正常所見、common diseaseの基礎知識
- 急性腹症の基礎知識
- 拡散強調画像の応用

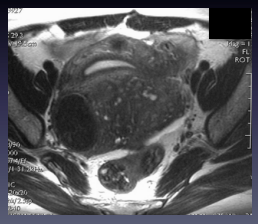
MRI信号強度の基礎知識

T1WI、T2WI コントラスト

- T1は主に形態、T2は主にコントラスト



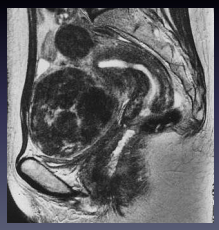
T1WI



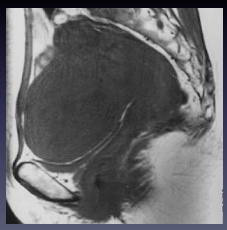
T2WI

T1WI、T2WI コントラスト

- T1は主に形態、T2は主にコントラスト



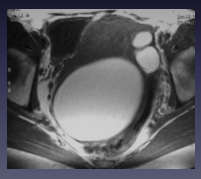
T2WI



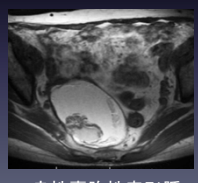
T1WI

T1WI

- T1WIで高信号を示すもの
  - 脂肪、出血、高タンパク濃度



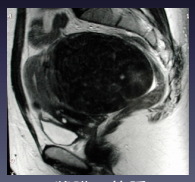
チョコレート嚢腫



良性嚢胞性奇形腫

T2WI

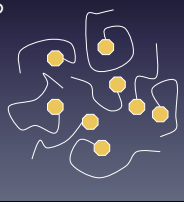
- T2WIで低信号を示すもの
  – 出血、線維成分に富んだ腫瘍


漿膜下筋腫


チョコレート嚢腫

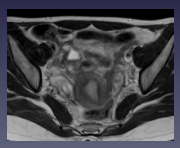
DWI (Diffusion-weighted image)

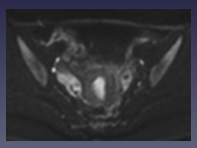
- プロトンの拡散運動の画像化
- 悪性腫瘍では細胞密度上昇により、拡散が抑制され、高信号となる



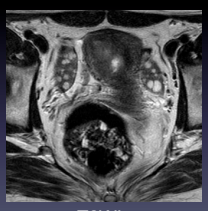
DWI

- 子宮内膜、卵巣、リンパ節は高信号
- ADC (apparent diffusion coefficient) による定量的評価

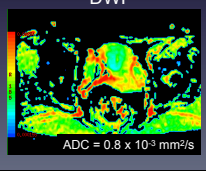

T2WI


DWI

DWI


T2WI


DWI

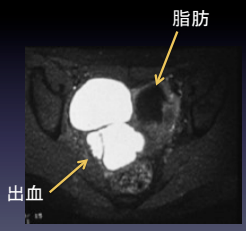


脂肪抑制法

- CHESS：水と脂肪の周波数の差を利用
  （Saturation pulse = 90°）
- STIR：水と脂肪のT1緩和時間の差を利用
- SPIR, SPAIR：水と脂肪の周波数の差を利用
  （Inversion pulse > 90°）
- Dixon：水と脂肪の位相の差を利用

脂肪抑制法 (CHESS)

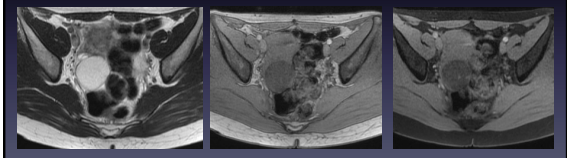

T1WI



T1脂肪抑制

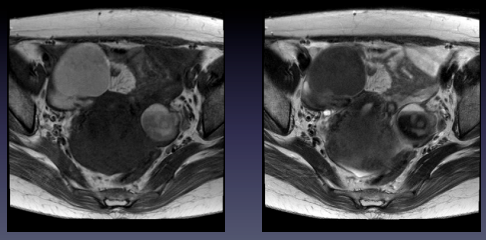
CHESS, SPIR : pitfall

- 脂肪に乏しい良性嚢胞性奇形腫



T2WI　T1WI　T1脂肪抑制

Shading sign



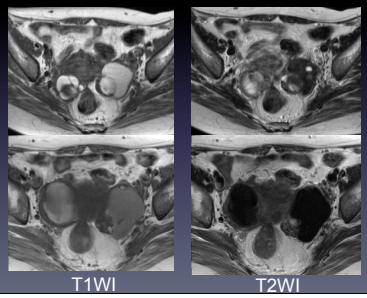
T1WI　T2WI

Shading sign

- T1高信号の卵巣腫瘍において認められる、T2WIでの低信号（腫瘍全体、あるいはfluid levelを形成）
- 繰り返す出血により、内容液が高粘稠、高蛋白、高Fe含有になることによる
- 内膜症性嚢胞にかなり特異的

3T MRI

- Shading

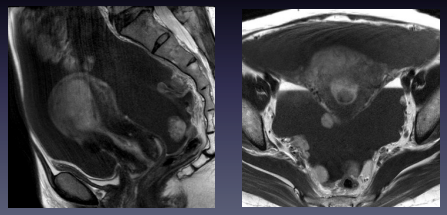


1.5T
3T
T1WI　T2WI

3T MRI

- 磁化率効果

血性腹水

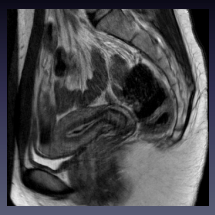


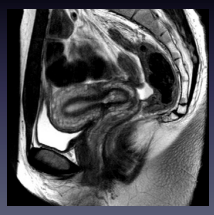
T2WI

正常所見、common diseaseの基礎知識

正常解剖

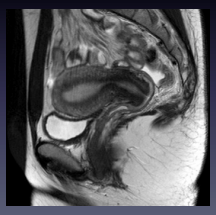
- 子宮

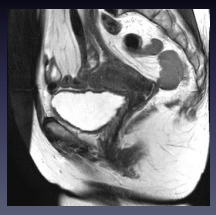

月経期


分泌期

正常解剖

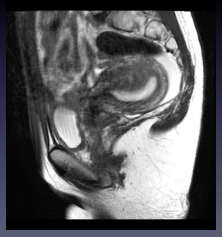
- 子宮


閉経前


閉経後

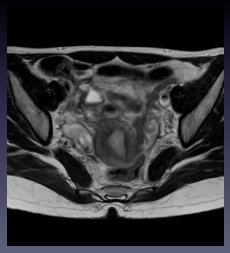
正常解剖

- 子宮


筋層の一過性収縮

正常解剖

- 卵巣

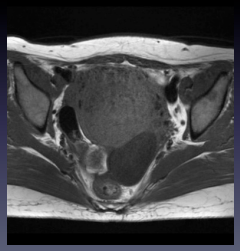

T2WI


DWI

機能性嚢胞

- 卵胞嚢胞
  - 排卵時に卵胞が破裂せずに残存したもの
- 黄体嚢胞
  - 排卵後に卵胞壁が修復されたもの

卵胞嚢胞


T1WI

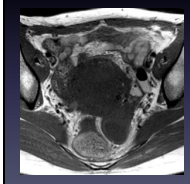

T2WI

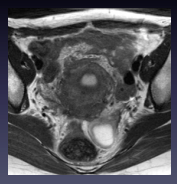
黄体嚢胞

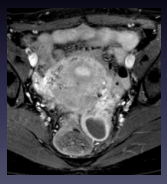

T2WI


造影T1脂肪抑制

黄体嚢胞？


T1WI


T2WI


造影T1脂肪抑制

黄体嚢胞？

- 1年後follow-up


T1WI


T2WI

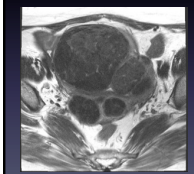
内膜症性嚢胞

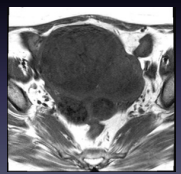
- 1年後follow-up


T1WI


T2WI

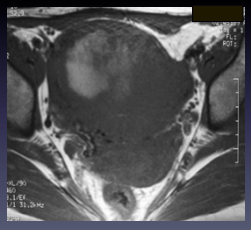
子宮筋腫


T2WI


T1WI

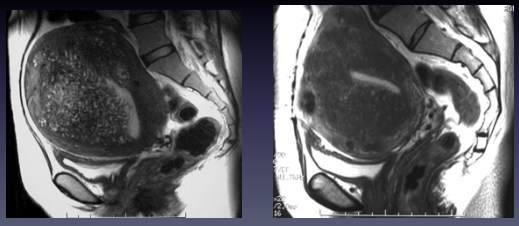

T2WI Sag

平滑筋肉腫


T1WI


T2WI

子宮腺筋症



T2WI

卵巣腫瘍

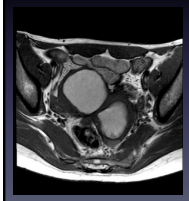
- 成熟嚢胞性奇形腫

T1WI

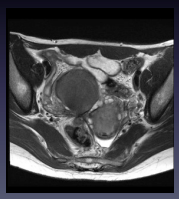
T1脂肪抑制

卵巣腫瘍

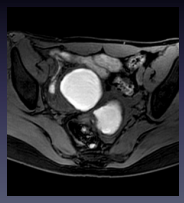
- 内膜症性嚢胞



T1WI



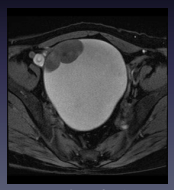
T2WI



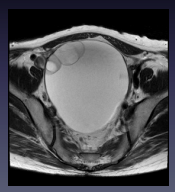
T1脂肪抑制

卵巣腫瘍

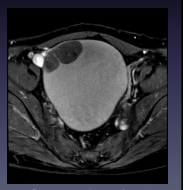
- 良性粘液性嚢胞腺腫



T1脂肪抑制



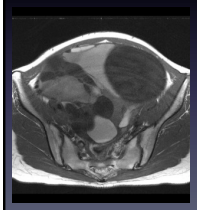
T2WI



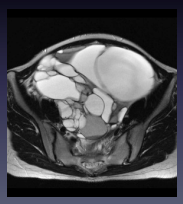
造影T1脂肪抑制

卵巣腫瘍

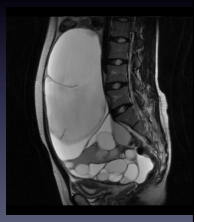
- 粘液性境界悪性腫瘍



T1WI



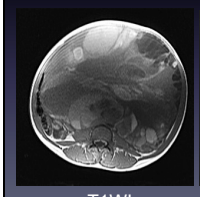
T2WI



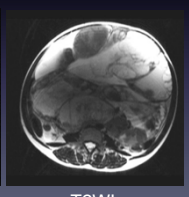
T2WI

卵巣腫瘍

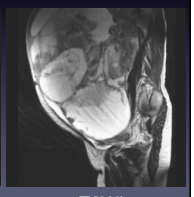
- 粘液性嚢胞腺癌



T1WI



T2WI

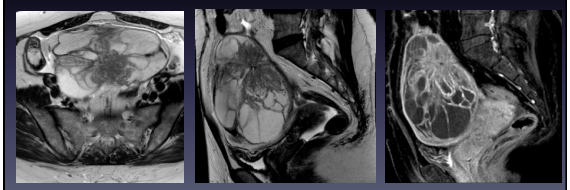


T2WI

粘液性腫瘍
良性と境界悪性の鑑別

- 良性、境界悪性の鑑別は画像ではしばしば困難である
- サイズは鑑別には役立たない
- 房の数と悪性度は相関
- 明らかな充実成分は悪性を考えるが、卵巣転移（特に大腸癌）との鑑別は難しい

大腸癌の卵巣転移

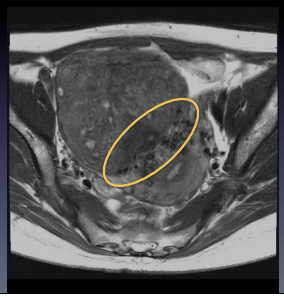


T2WI　T2WI　造影T1脂肪抑制

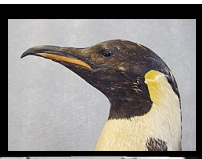
漿膜下子宮筋腫と卵巣腫瘍の鑑別

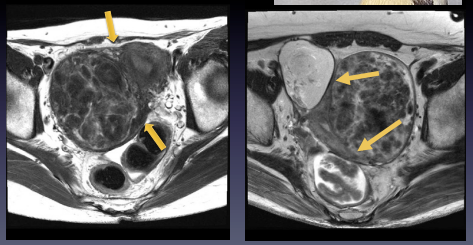
- Beak sign
- Interface vessel sign
- 子宮の伸展
- Ovarian vascular pedicle sign
- 両側卵巣が確認できる

Interface vessel sign
(Bridging vascular sign)



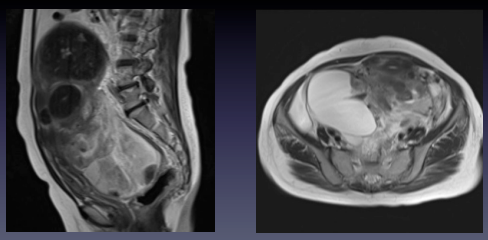
Beak sign





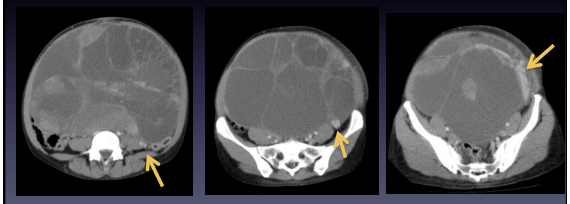
T2WI　T2WI

子宮の伸展

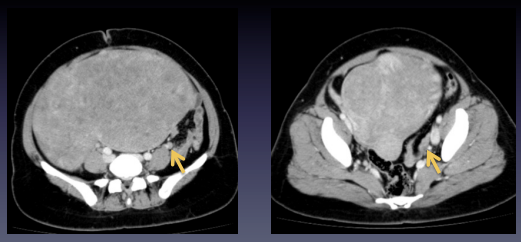


T2WI

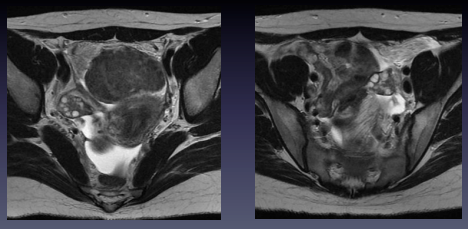
Ovarian vascular pedicle sign



Ovarian vascular pedicle sign 陰性

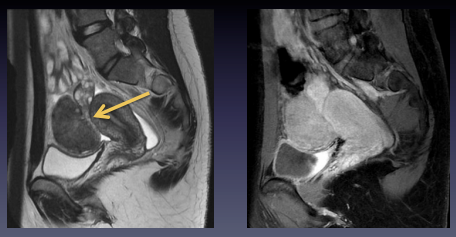


両側卵巣が確認できる：pitfall



T2WI

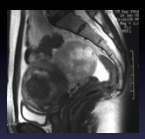
両側卵巣が確認できる：pitfall

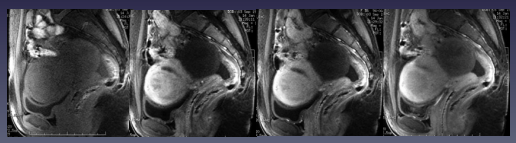


T2WI　　造影T1脂肪抑制

漿膜下子宮筋腫と卵巣線維腫の鑑別

- Dynamic MRI





卵管

- MRIでは正常卵管は通常描出されない
- 卵管瘤水腫になると管状、ソーセージ状の管構造として認識される

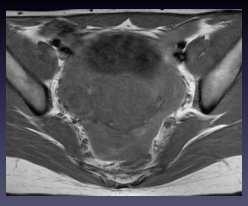
急性腹症の基礎知識

急性腹症

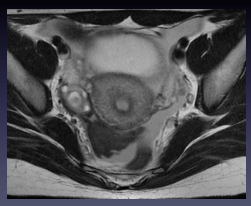
- 卵巣出血
- 卵巣腫瘍破裂
- 卵巣腫瘍茎捻転
- 子宮外妊娠
- 感染症
- 子宮筋腫赤色変性

急性腹症

- 卵巣出血



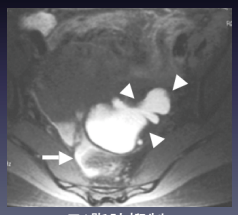
T1WI



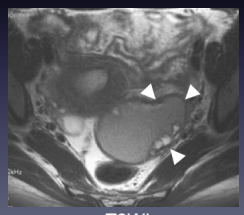
T2WI

急性腹症

- 内膜症性嚢胞の破裂



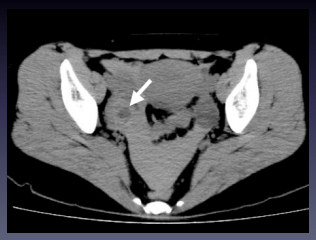
T1脂肪抑制



T2WI

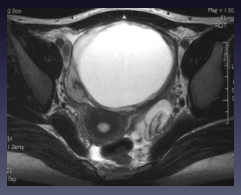
急性腹症

- 子宮外妊娠

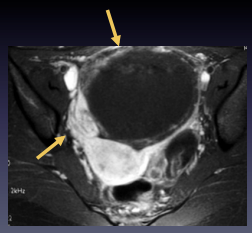


急性腹症

- 卵巣腫瘍茎捻転



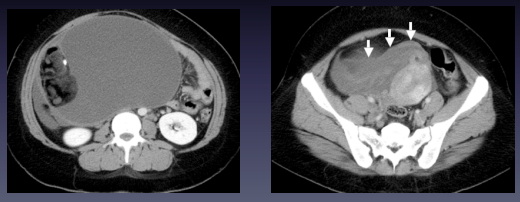
T2WI



造影T1脂肪抑制

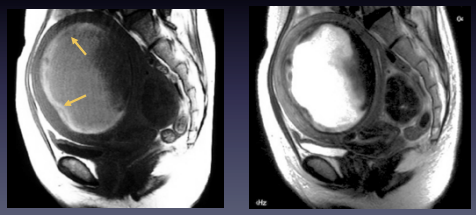
急性腹症

- 嚢胞性奇形腫の茎捻転



急性腹症

- 子宮筋腫の赤色変性

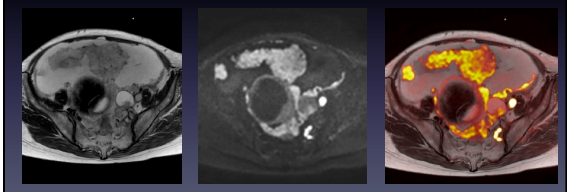


T1WI　　T2WI

拡散強調画像の応用

拡散強調画像の応用

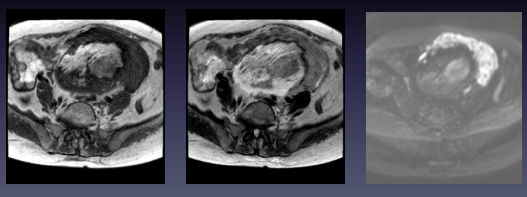
- 卵巣癌　腹膜播種



T2WI　　DWI　　Fusion

拡散強調画像の応用

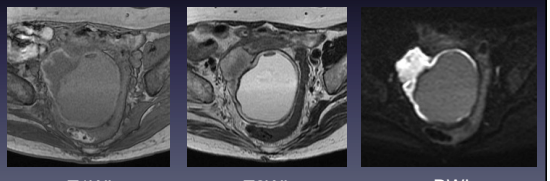
- 成熟嚢胞性奇形腫の悪性転化



T1WI　　T2WI　　DWI

拡散強調画像の応用

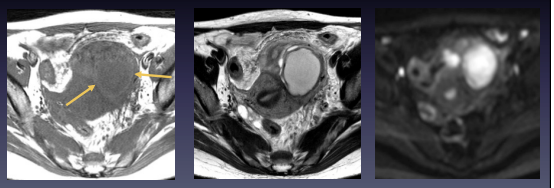
- 卵巣腫瘍茎捻転



T1WI　　T2WI　　DWI

拡散強調画像の応用

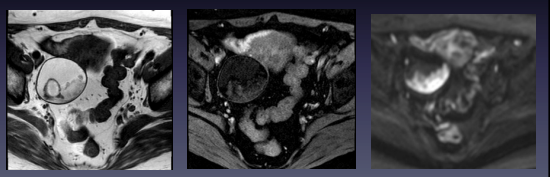
- 卵管卵巣膿瘍



T1WI　T2WI　DWI

拡散強調画像の応用: pitfall

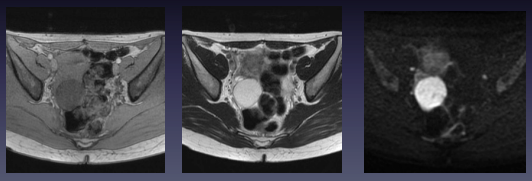
- 成熟嚢胞性奇形腫



T1WI　T1脂肪抑制　DWI

拡散強調画像の応用: pitfall

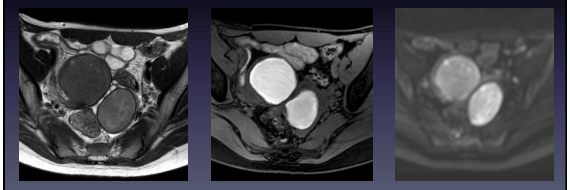
- 脂肪に乏しい成熟嚢胞性奇形腫



T1WI　T2WI　DWI

拡散強調画像の応用: pitfall

- 内膜症性嚢胞



T2WI　T1脂肪抑制　DWI

症例

- 20歳台　女性　下腹部痛
- USで卵巣腫瘍疑い
- CA125, AFP軽度高値

MRI