Santral Sinir Sistemi İnfeksiyonlarında Radyolojik Yaklaşım

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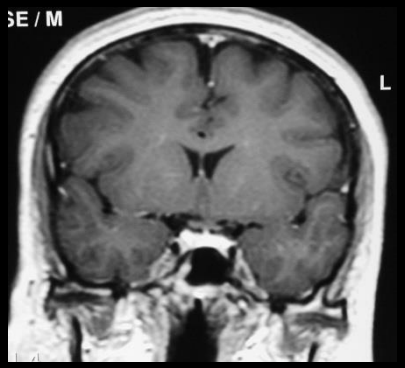
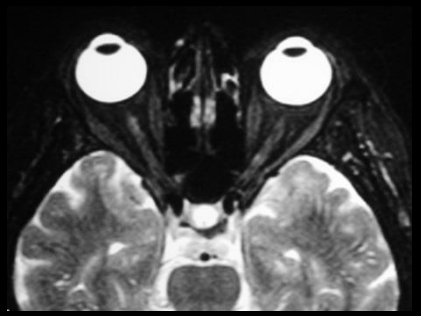
Akdeniz Üniversitesi

Radyoloji A.B.D.

Manyetik Rezonans Görüntüleme

- Tüm MRG incelemelerinin % 60-70 kadarı santral sinir sistemi incelemesi



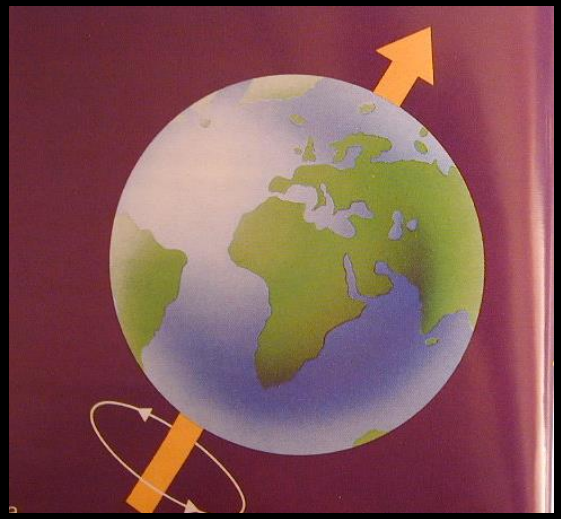


Manyetik Rezonans Görüntüleme

- Yüksek güçte manyetik alan

1.5 Tesla

3 Tesla



X 30 000

X 60 000

DİKKAT

Kuvvetli Mıknatıs Alanı Gece ve Gündüz Çalışmaya Devam Etmektedir.

Kalp pili olan kişilerin girmesi yasaktır.

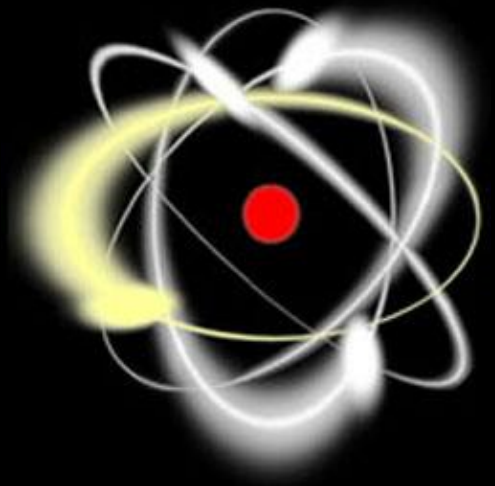
Kredi kartları ve manyetik kartlarla girilmesi yasaktır.

Metal Kalem, anahtar,makas, tamir malzemeleri ve ziynet eşyalarıyla girilmesi yasaktır.

Magnet ; saate, diskete, elektronik malzemelere ve buna benzer eşyalara zarar verebilir.

Let's make things better.

Manyetik Rezonans Görüntüleme



- Protonlar
  (H atomu)

- Manyetik alan

- Radyo dalgaları

Manyetik Rezonans Görüntüleme

- T1
- T2

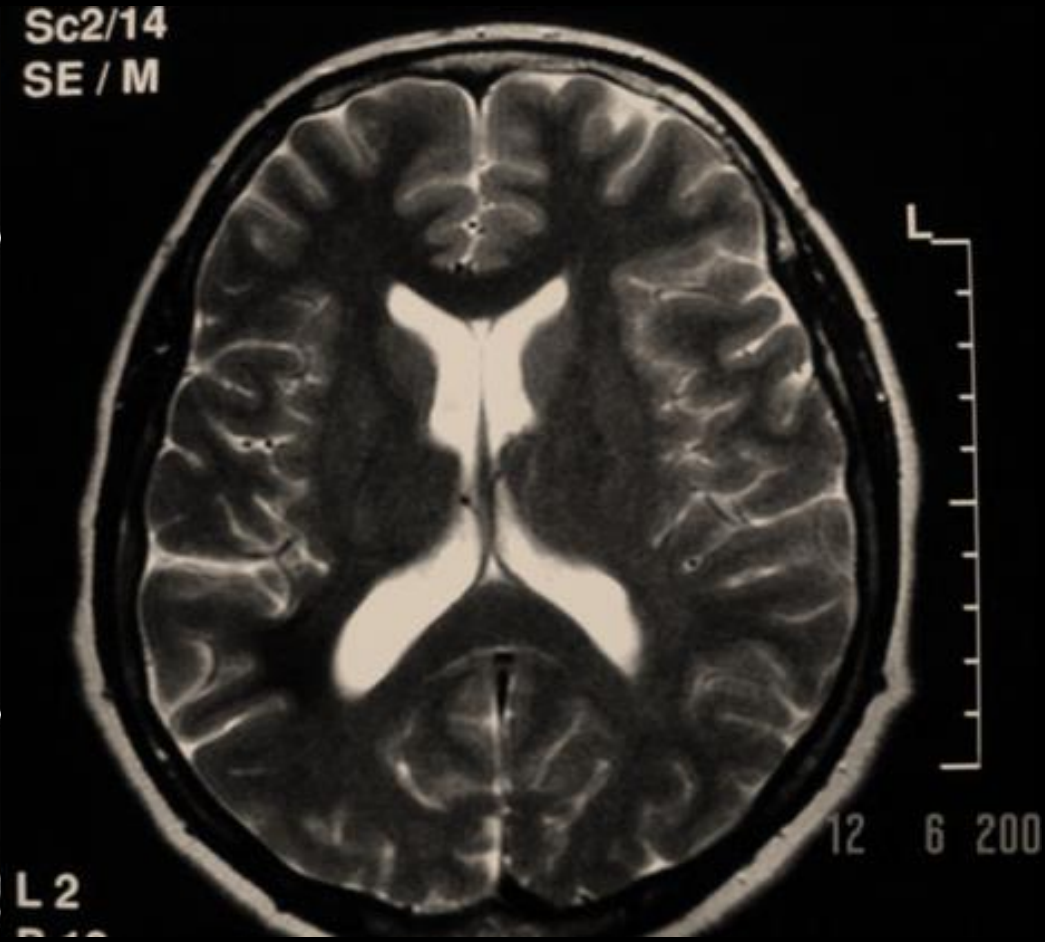
Manyetik Rezonans Görüntüleme

- Sekanslar
  - T1
  - T2
  - FLAIR
  - PD
  - Gradient eko
  - IR
  - STIR
  - SPIR
  - MTC
  - HASTE
  - SSFP
  - TFE
  - TOF
  - PC ……..

T1: Yağ dokusu parlak

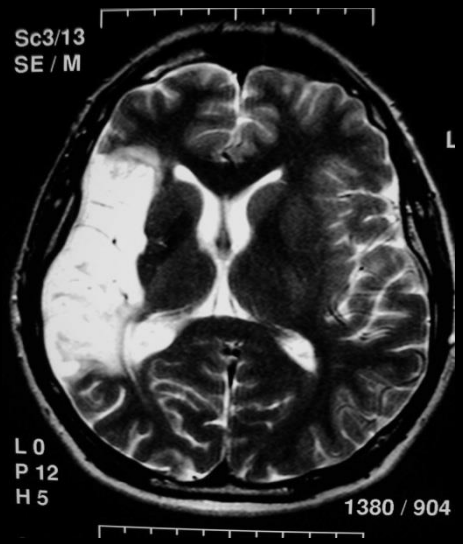
T2: Sıvılar parlak

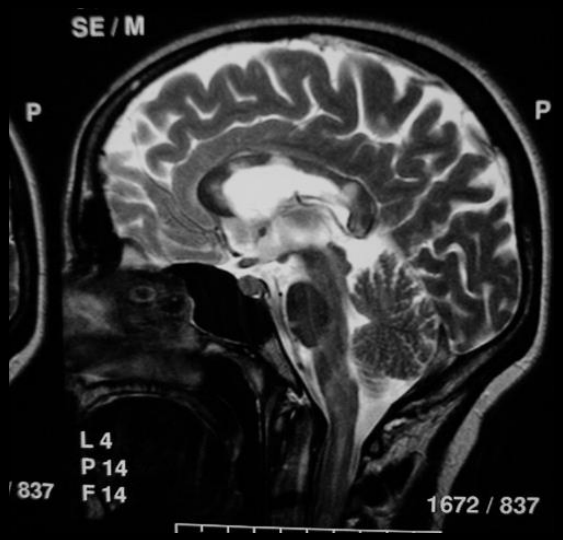

Sc3/14
SE / M
L
L 5
P 13
H 27

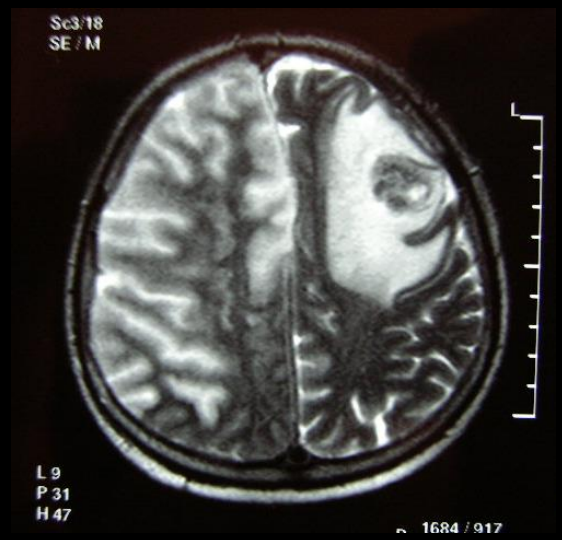

Sc2/14
SE / M
L
12 6 200
L 2

Manyetik Rezonans Görüntüleme

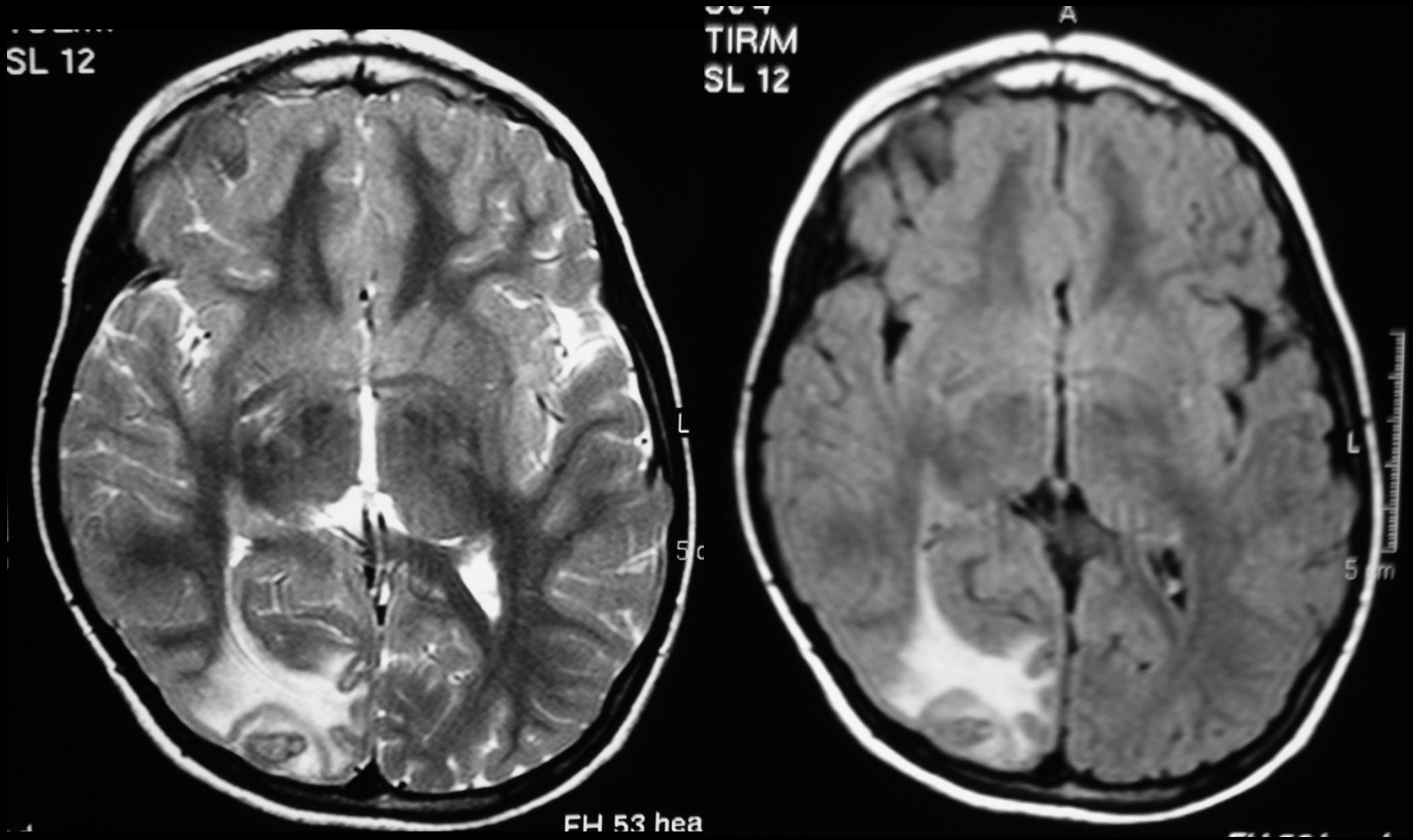
- T2= sıvılar parlak (hiperintens)
- T2= patolojiler (çoğu) parlak



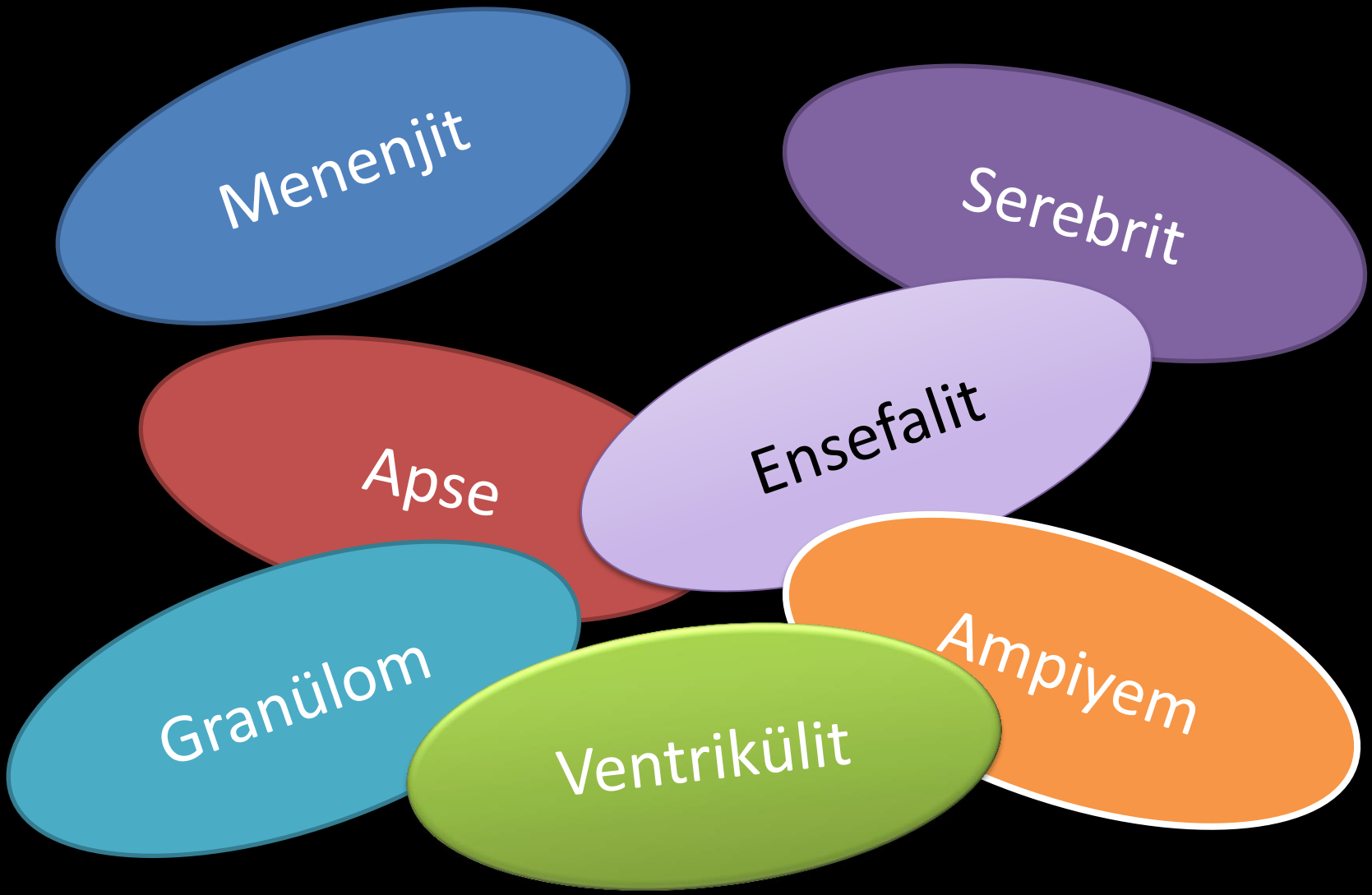




FLAIR



Santral Sinir Sistemi Enfeksiyonları



Menenjit

Enfeksiyöz

Bakteriyel / septik

Viral (enterovirüs, herpes..)

Kronik (Tbc, Syp, Brucella, Fungus..)

Non-Enfeksiyöz

Neoplastik

Kimyasal

Enfeksiyöz Menenjit

- AKUT & PİYOJENİK formu
  - Çocuklarda daha sık
  - Pnömokok & Neisseria
  - Viral (enterovirüs !)

Enfeksiyöz Menenjit

- Kronik formu
  - Bakteriyel
    - Syphilis
    - Brucella
    - Mikobakteri
  - Fungal
    - Kriptokok

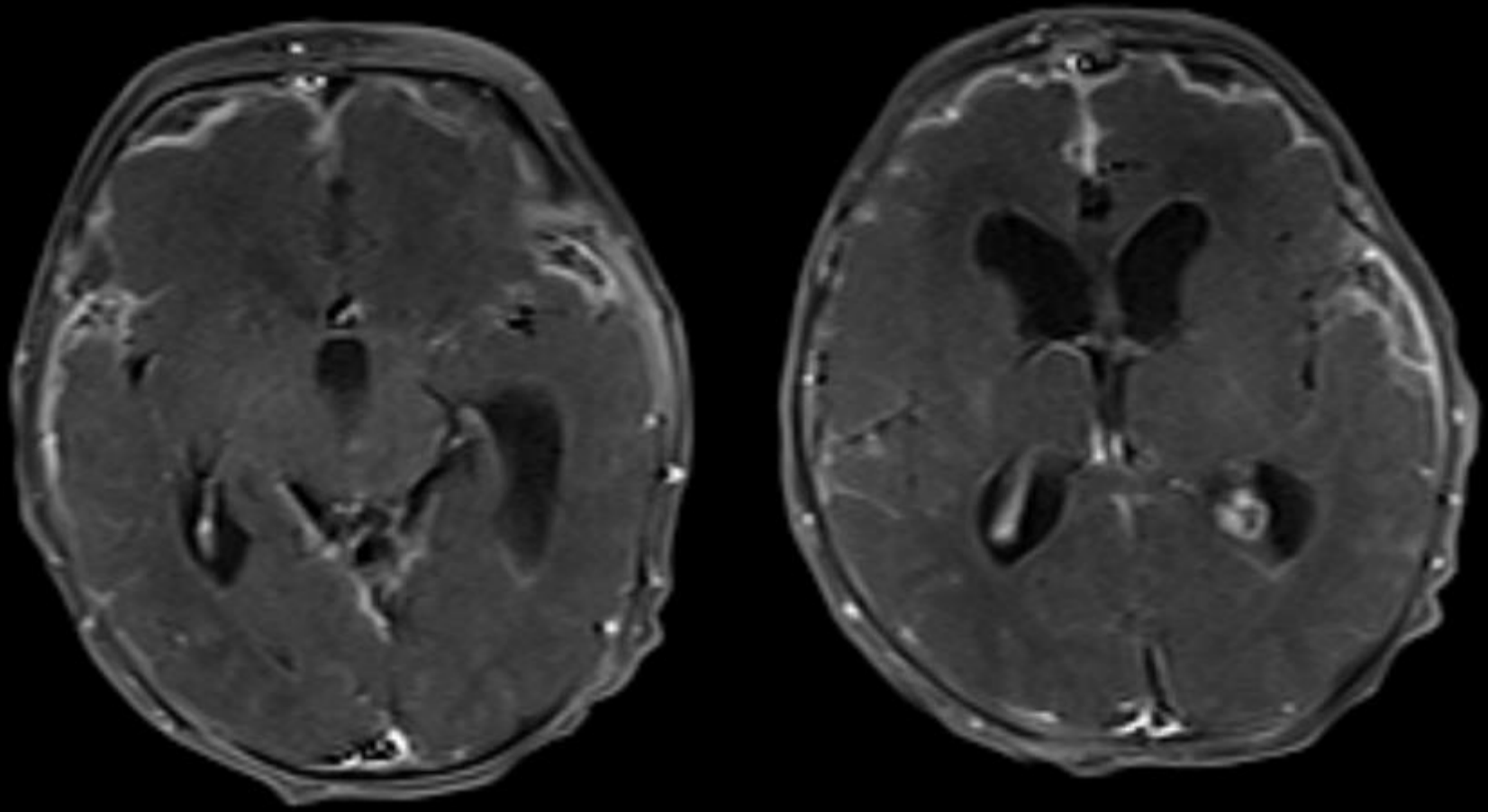
Akut bakteriyel menenjitler

- En sık SSS enfeksiyonu
- Enfeksiyöz ajanın yayılımı:
  - Hematojen
  - Yakın komşuluk (sinüsler, mastoid hücreler)
  - Direkt (operasyon, travma)
  - Perinöral (asendan)

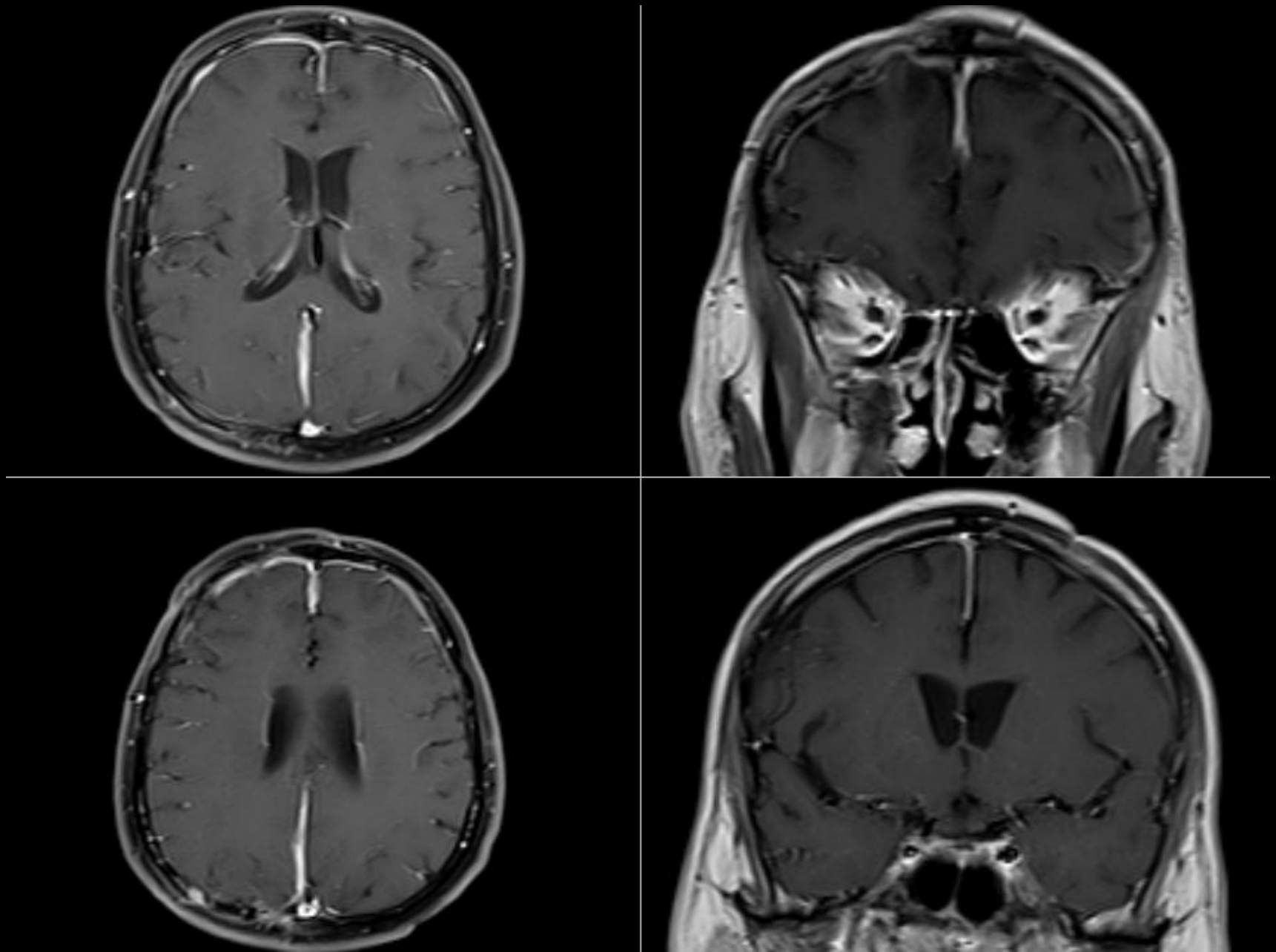
Akut bakteriyel menenjitler

- MRG normal olabilir (olguların yarısı !!)
- Amaç tanıdan çok komplikasyon görüntülemedir
- Leptomeningeal enhansman
- FLAIR'de bu alanlar parlak çıkabilir
- Sulkal / sisternal silinme

Leptomeningeal enhansman



Dural enhansman



Akut bakteriyel menenjtiler

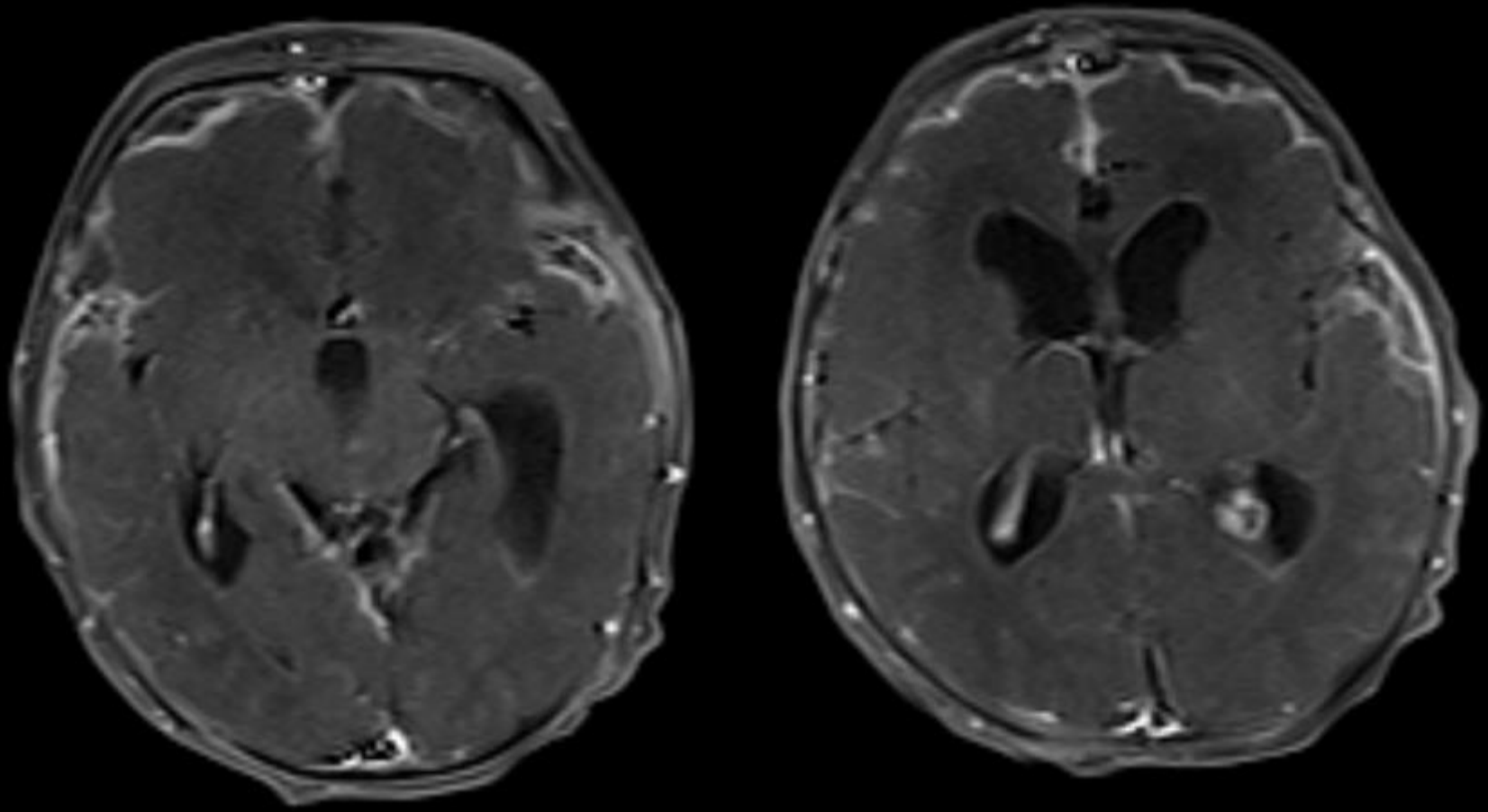
- Difüzyon MRG'lere özellikle dikkat

- Parankimal komplikasyonlar (meningovaskülit)
- Oklüzyon
- İskemi
- Parankim tutulumu erken bulgusu

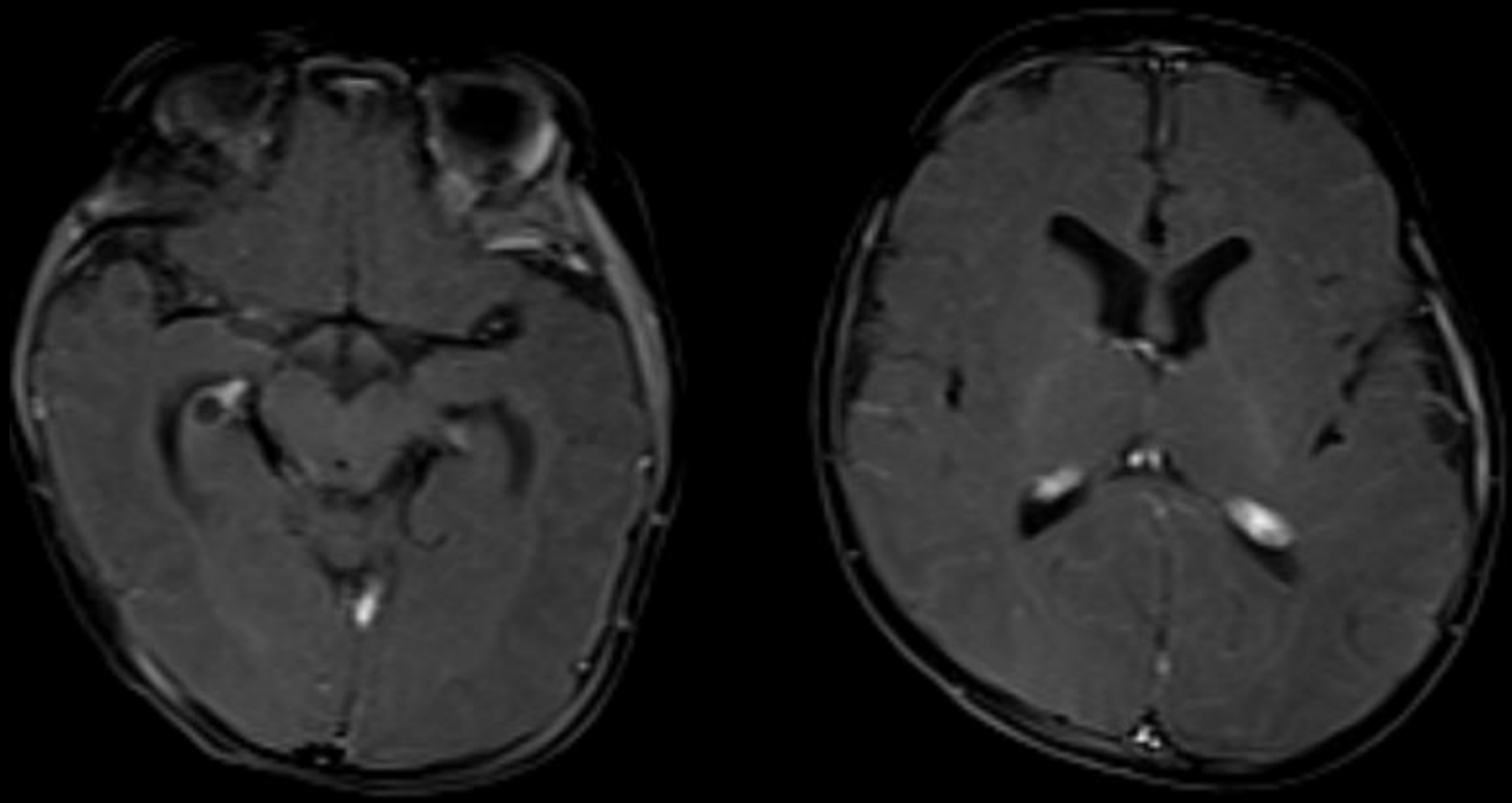
Akut bakteriyel menenjitler

- Komplikasyonlar ??
  - Hidrosefali
  - Ampiyem
  - Serebrit / Apse formasyonu
  - Vasküler tutulum→ İskemi & enfarkt
  - Sekel değişiklikler

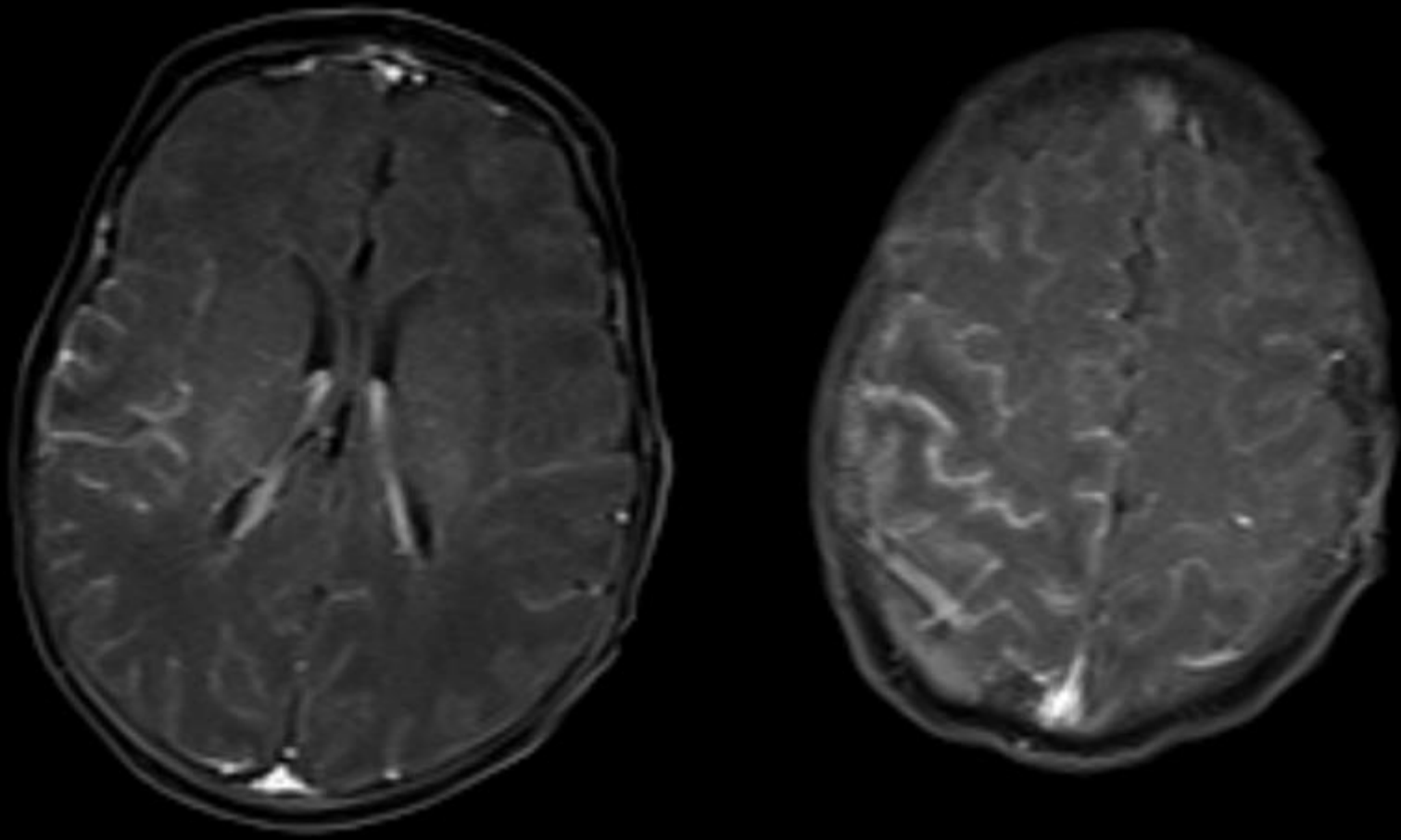
21 günlük, Erkek



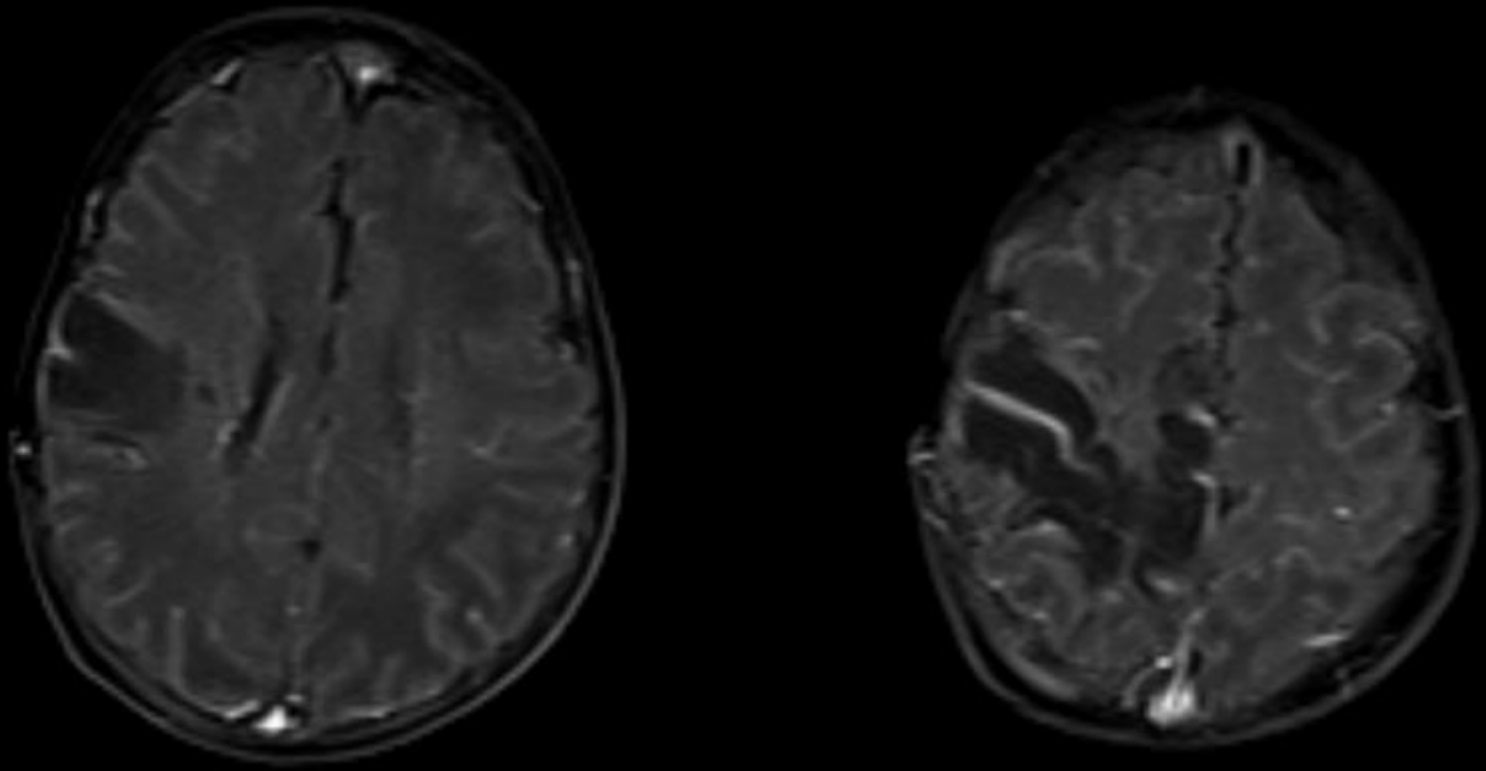
2 ay sonraki takip MRG



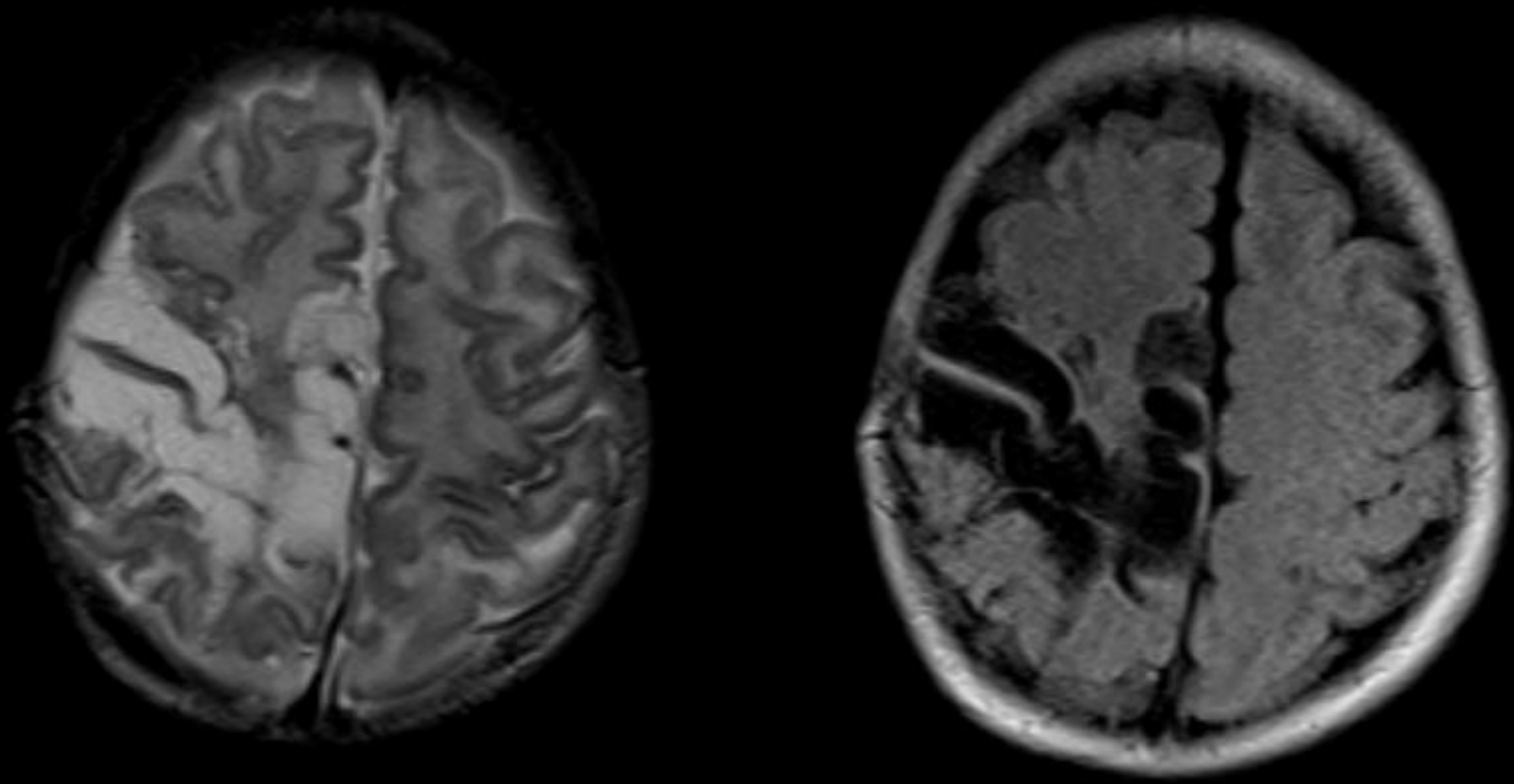
26 gün, Erkek



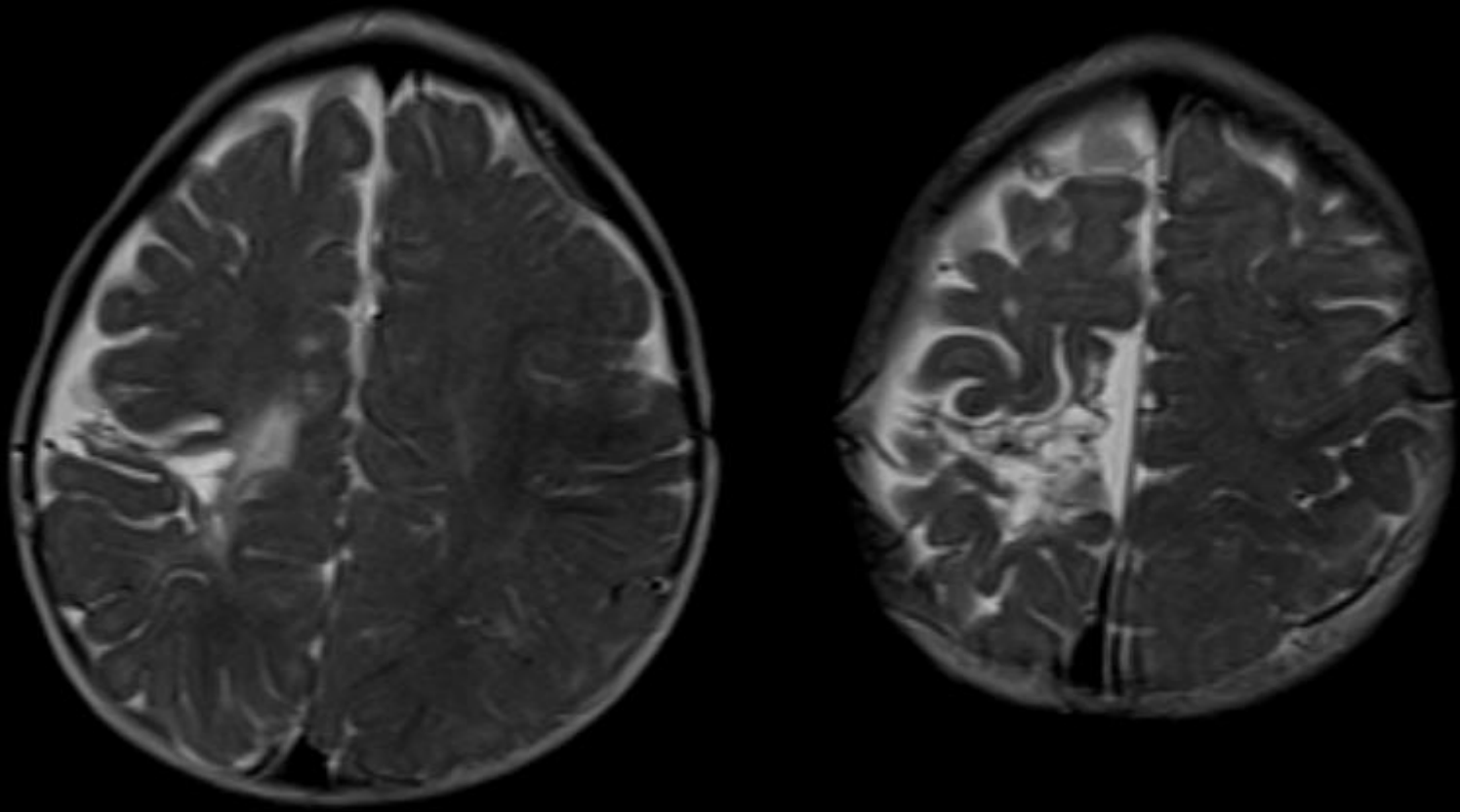
9 gün sonraki takip MRG



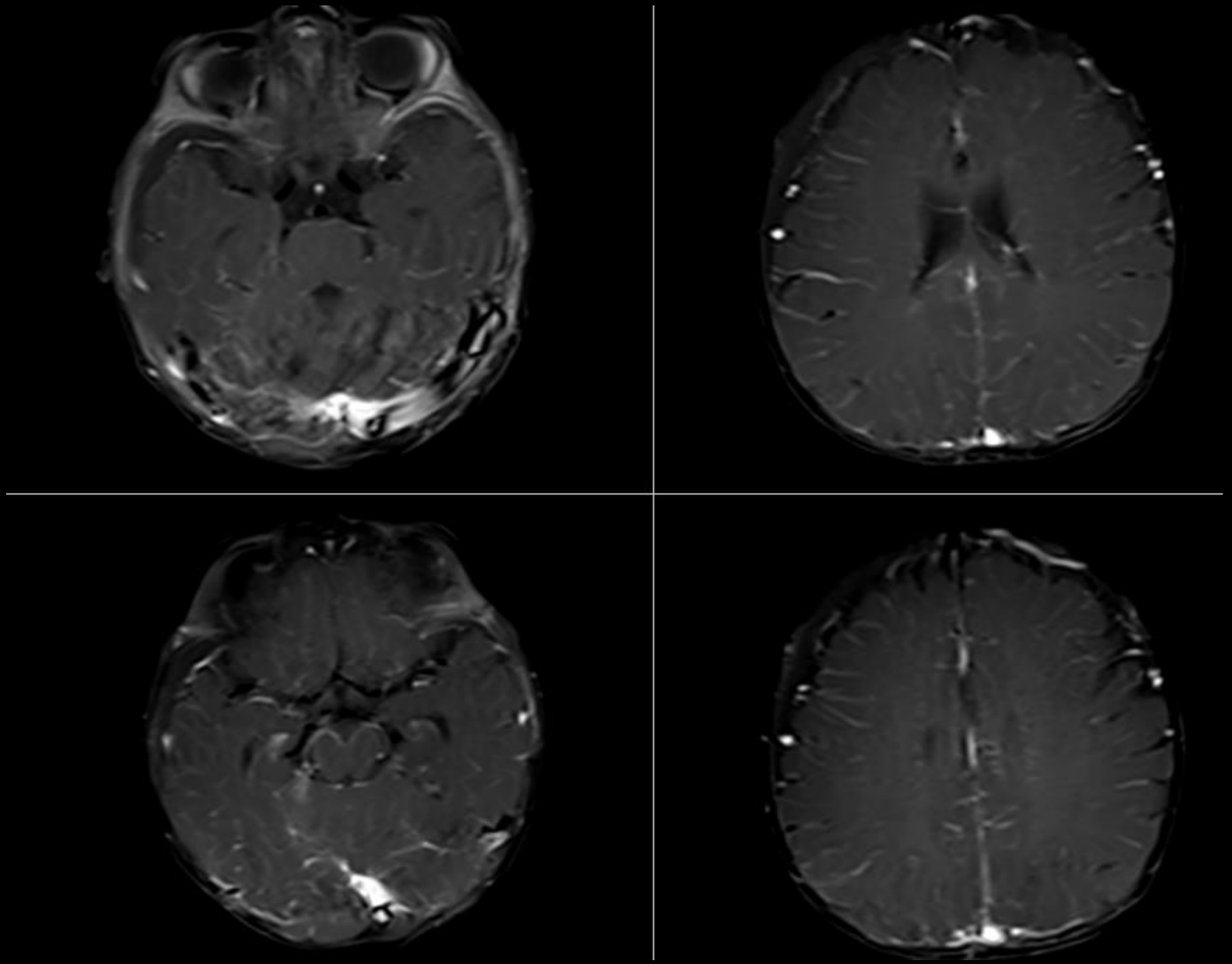
9 gün sonraki takip MRG

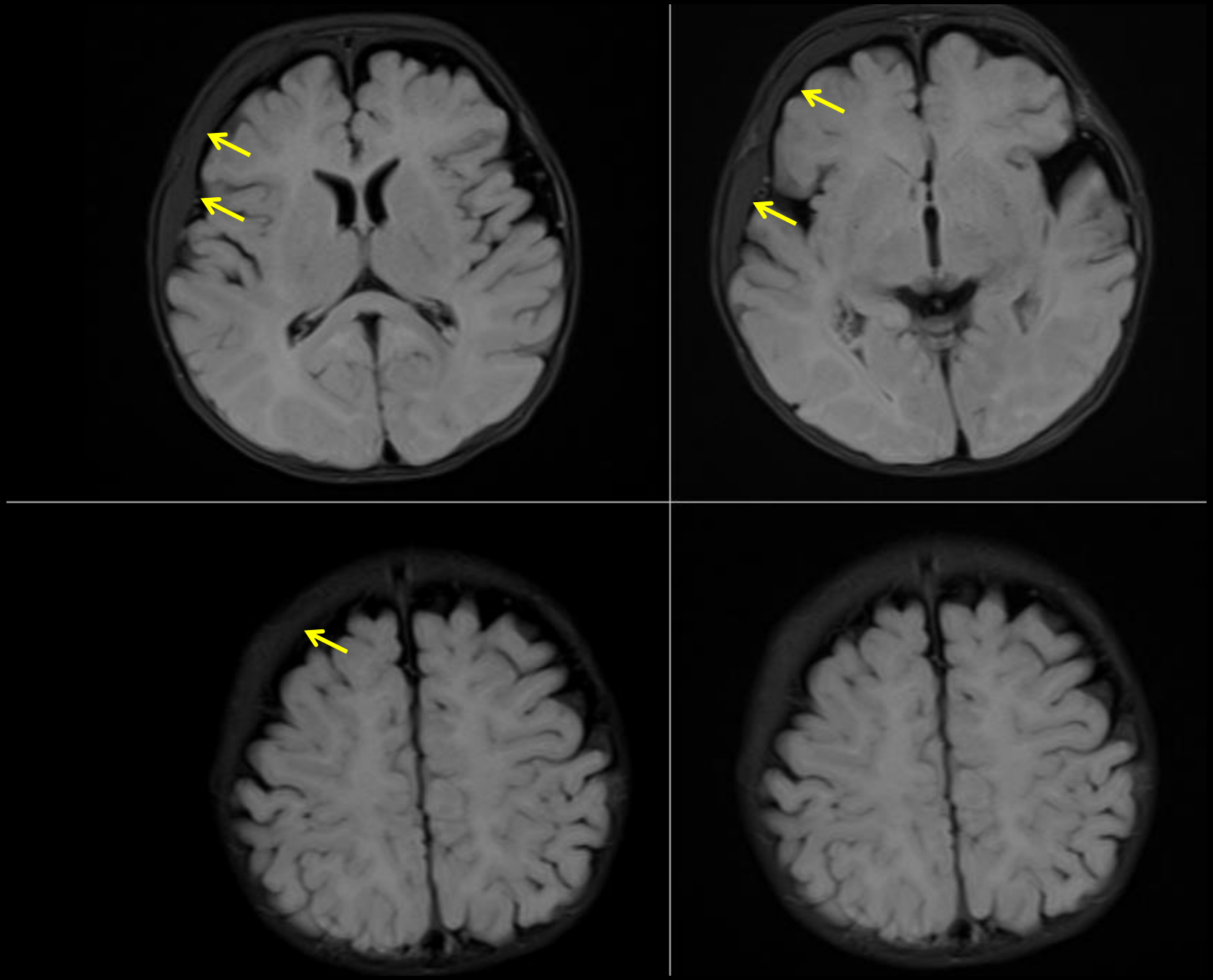


Bir yıl sonraki takip MRG

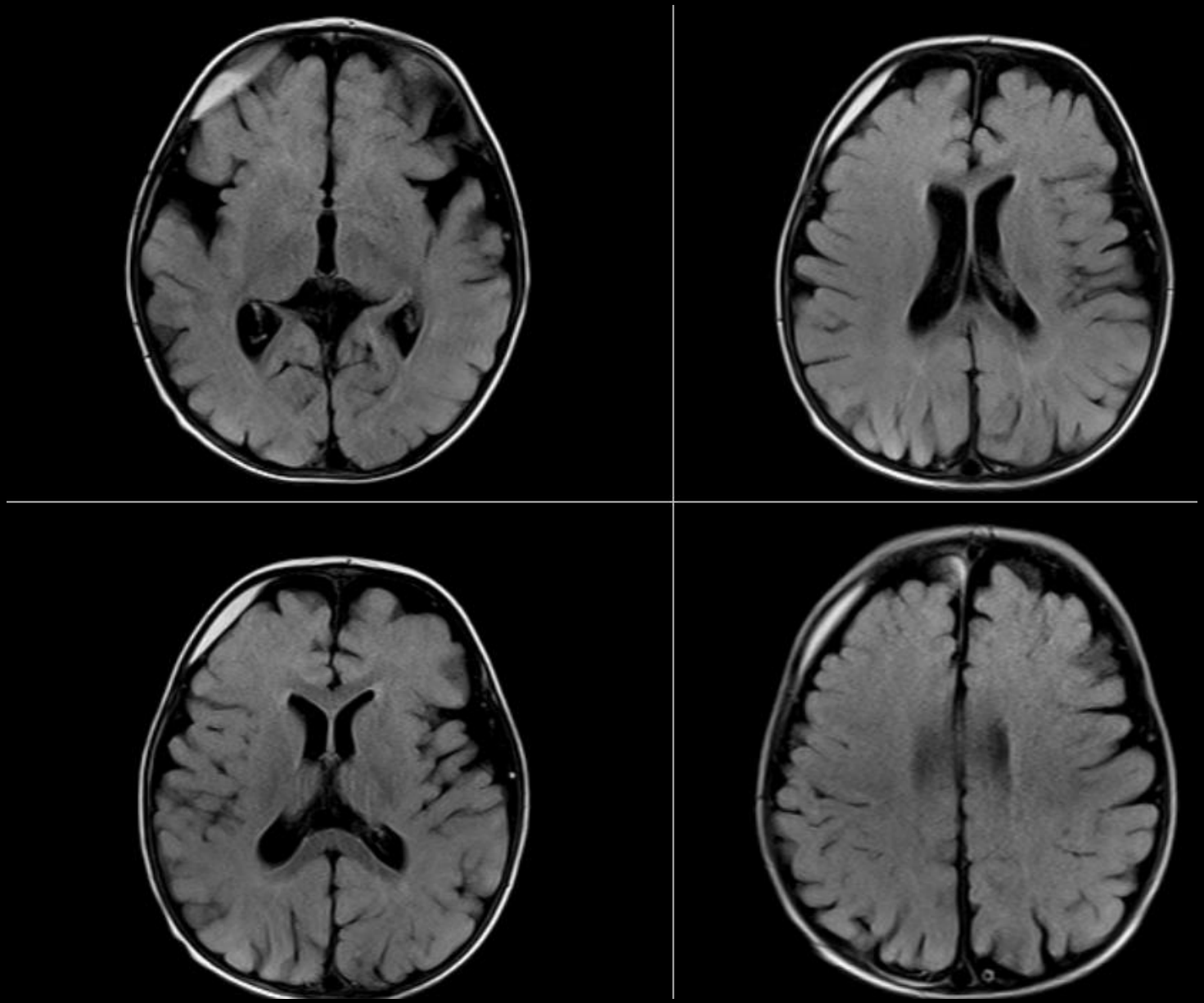


2 yaş erkek





6 ay sonraki takip MRG

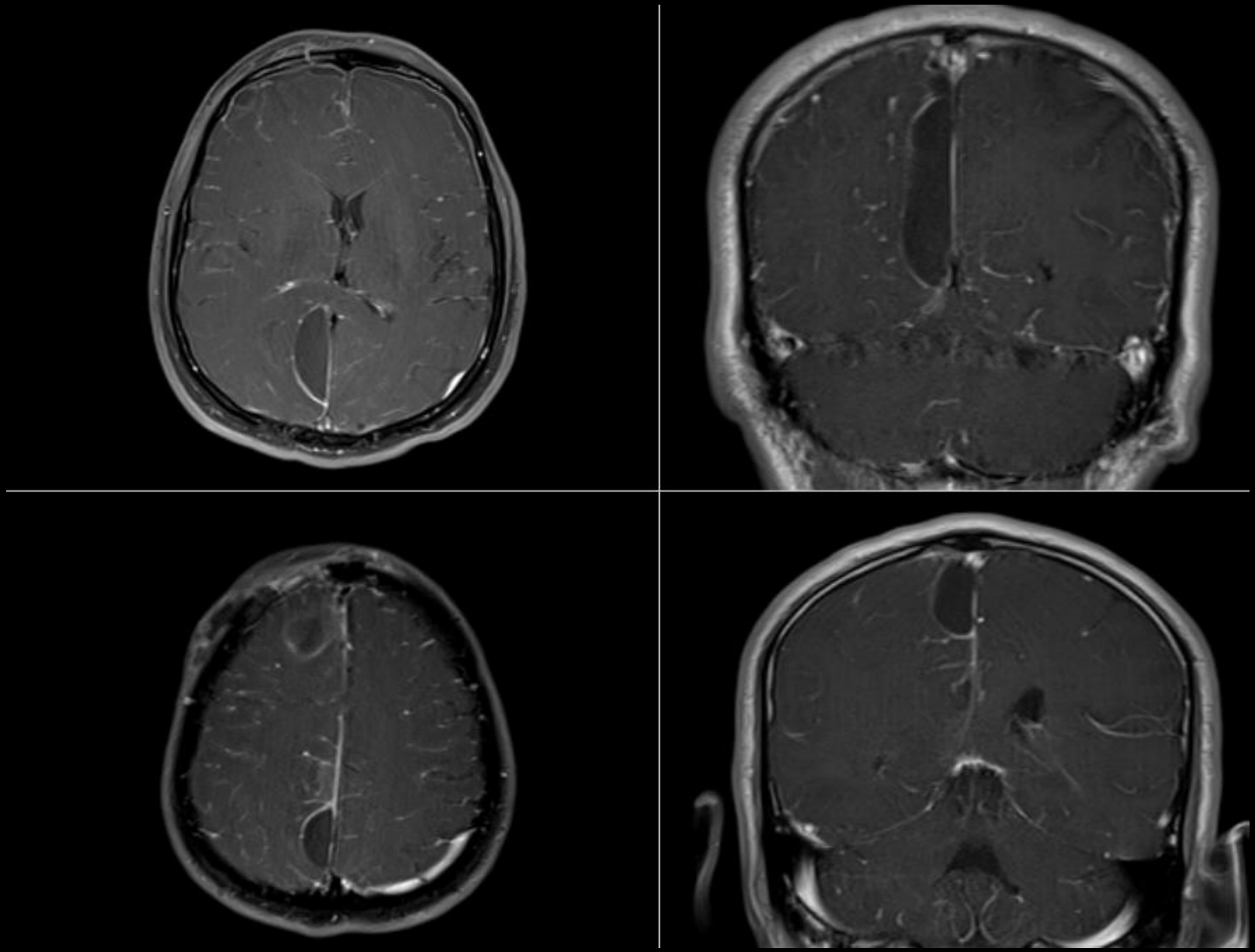


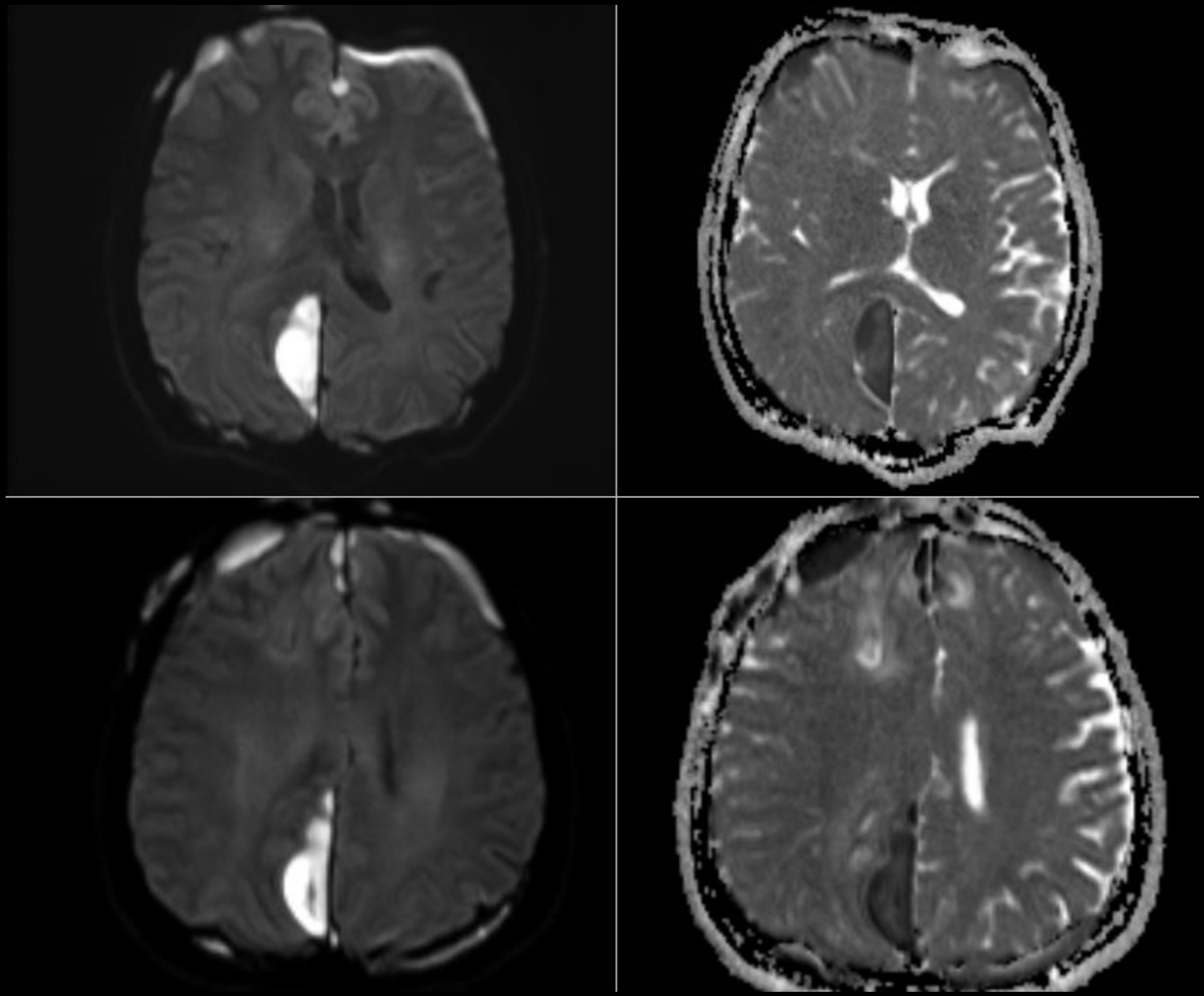
Ampiyem

- Subdural ya da epidural mesafede olabilir
- Subdural çok daha sık
  - Sinüzit
  - Mastoid hücrelerde enfeksiyon

- Epidural
  - Benzer nedenler
  - Post operatif

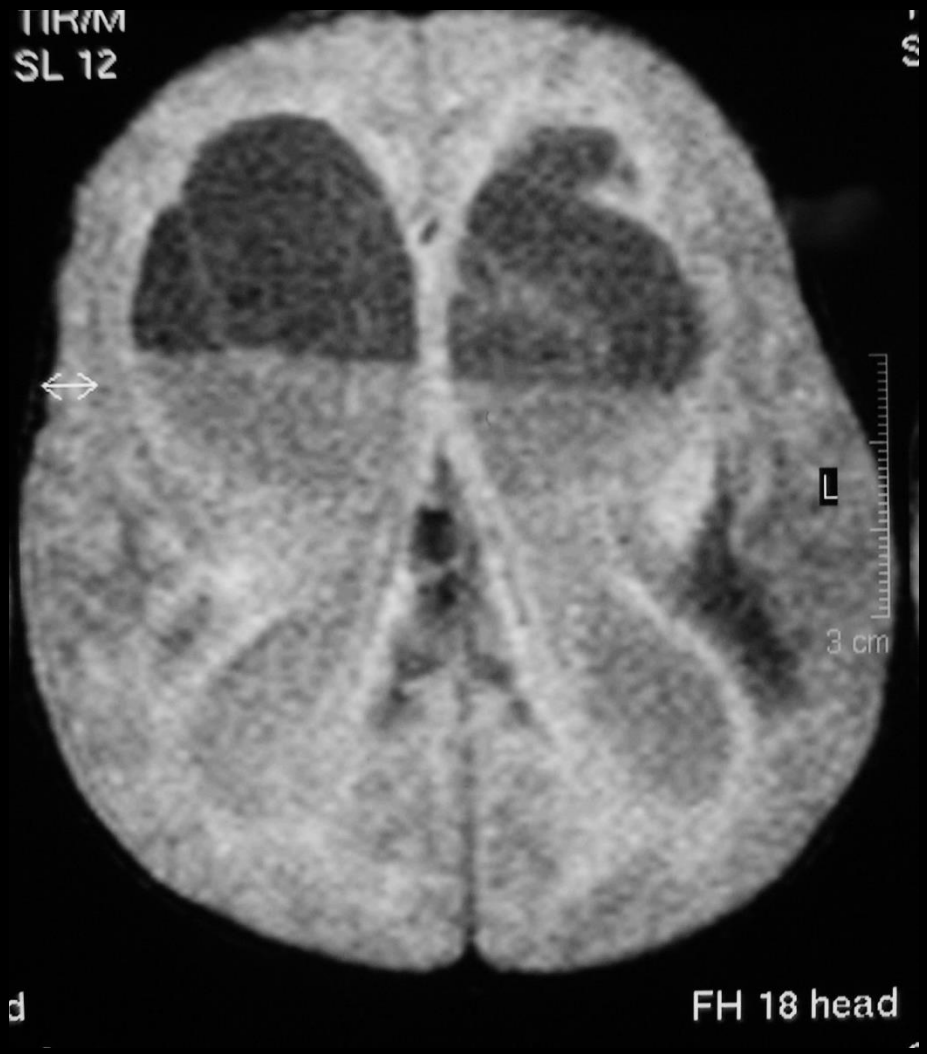
44 y, Erkek

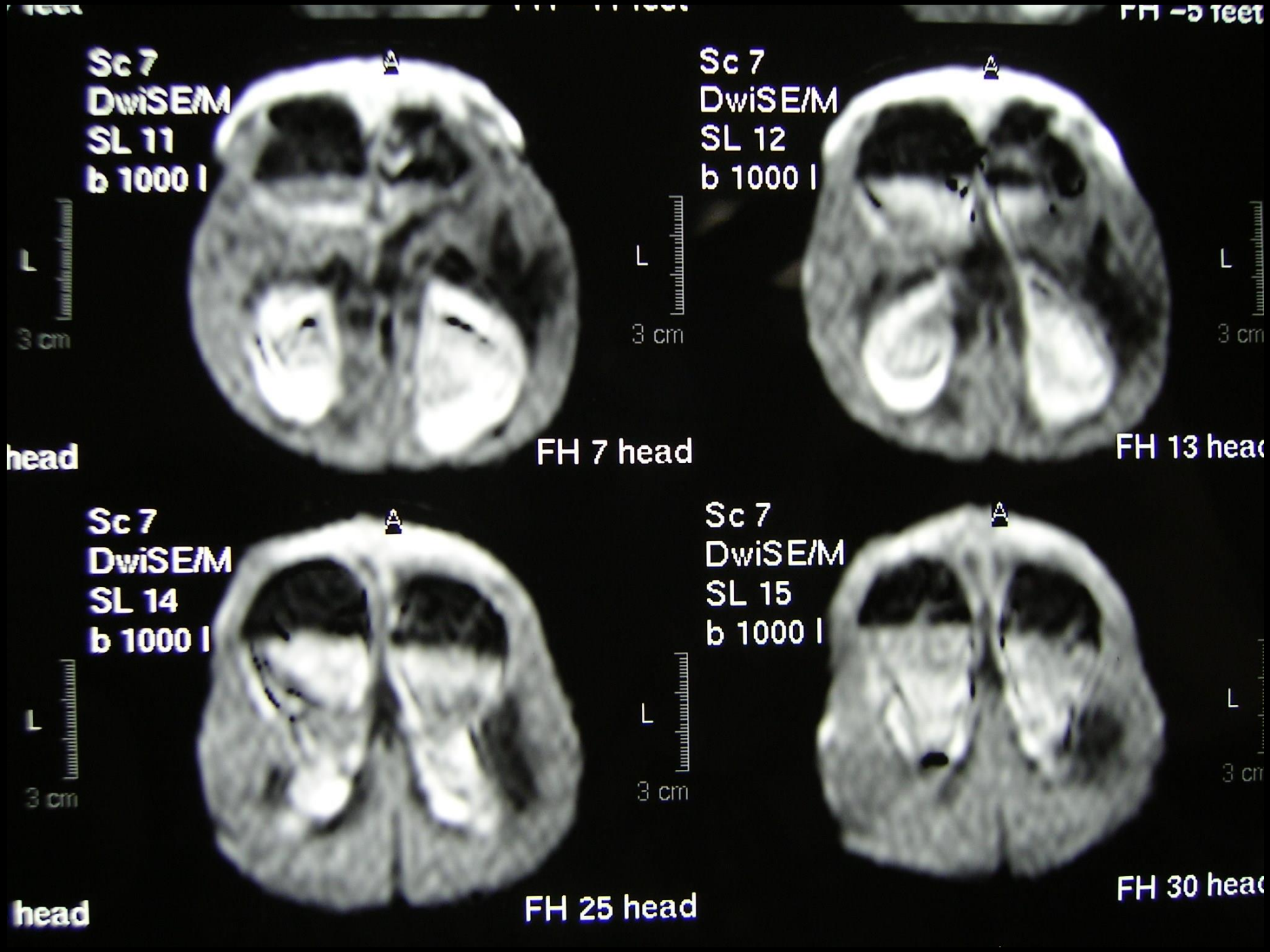


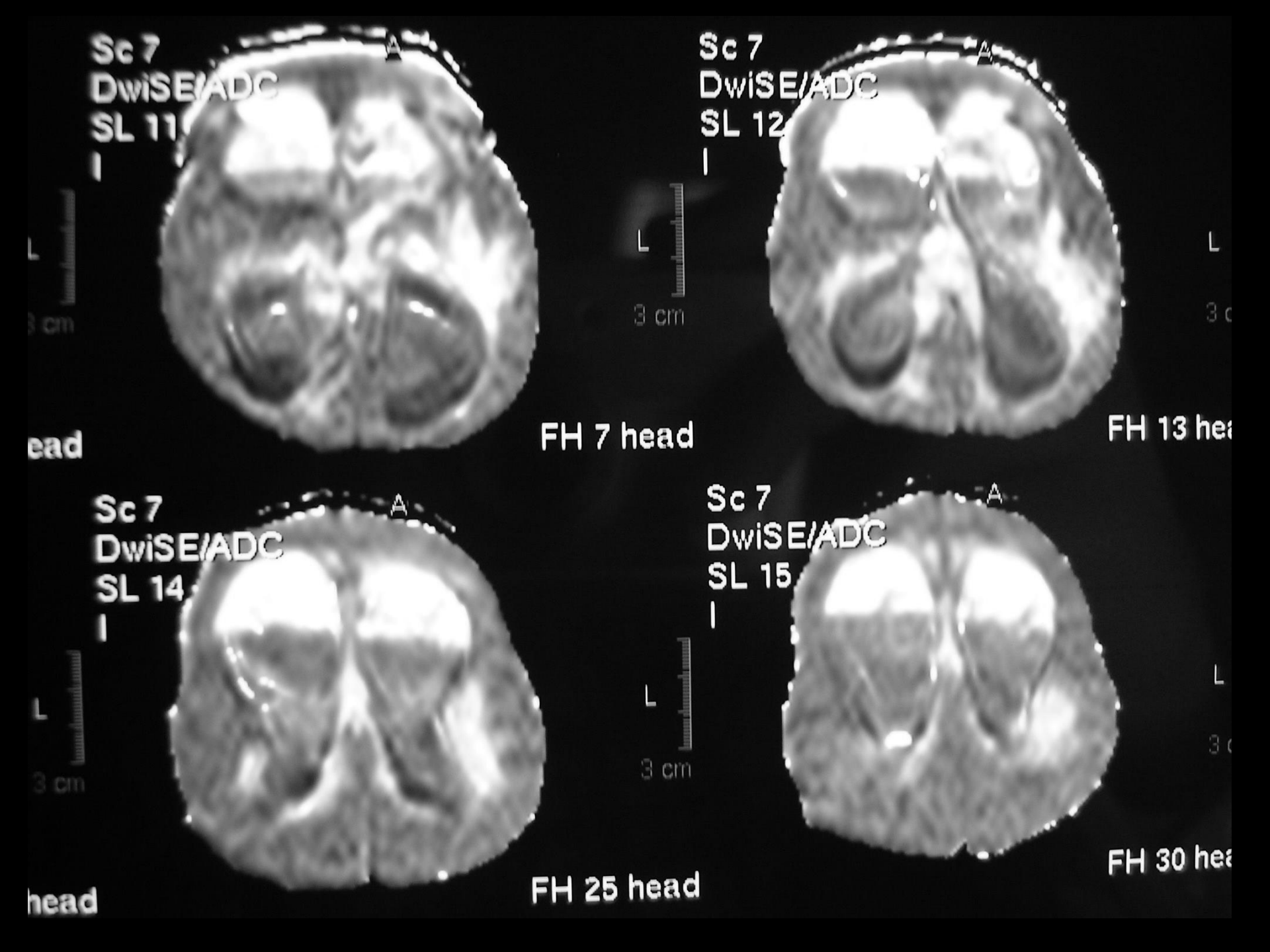


Yenidoğan, sepsis tablosu

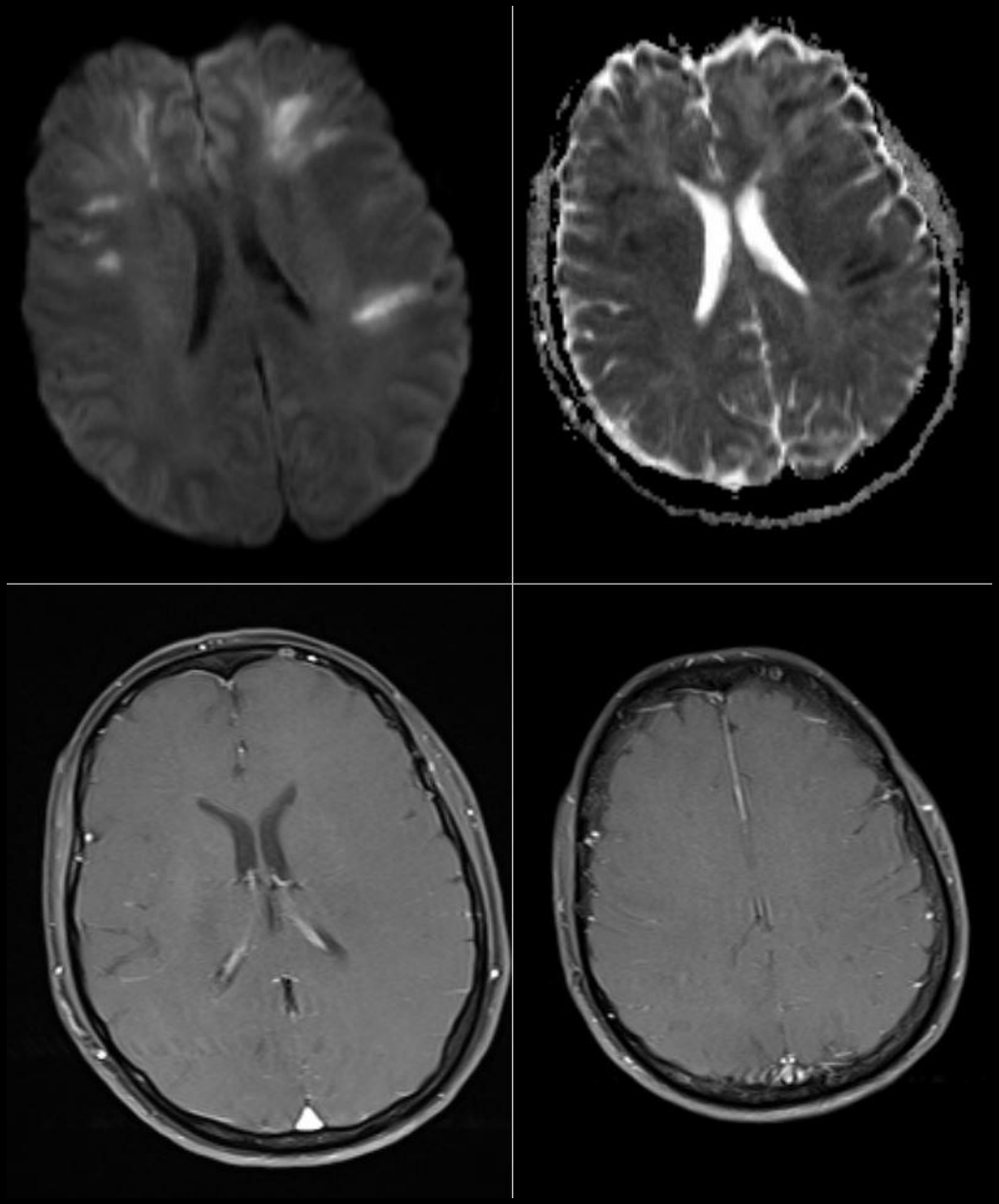
FLAIR



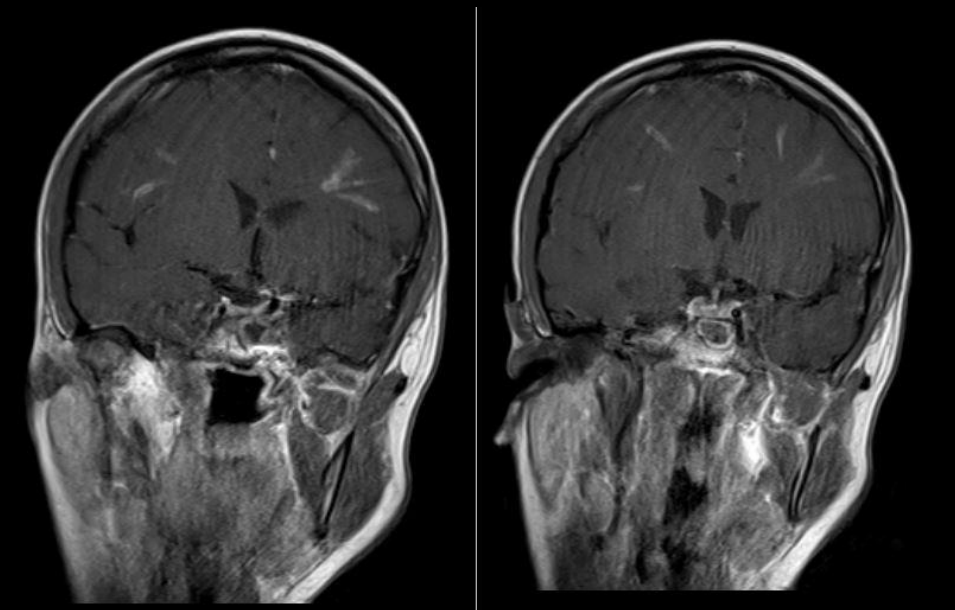

FH -5 feet
Sc 7
DwiSE/M
SL 11
b 1000 I
L
3 cm
head
FH 7 head
Sc 7
DwiSE/M
SL 12
b 1000 I
L
3 cm
FH 13 head
Sc 7
DwiSE/M
SL 14
b 1000 I
L
3 cm
head
FH 25 head
Sc 7
DwiSE/M
SL 15
b 1000 I
L
3 cm
FH 30 head

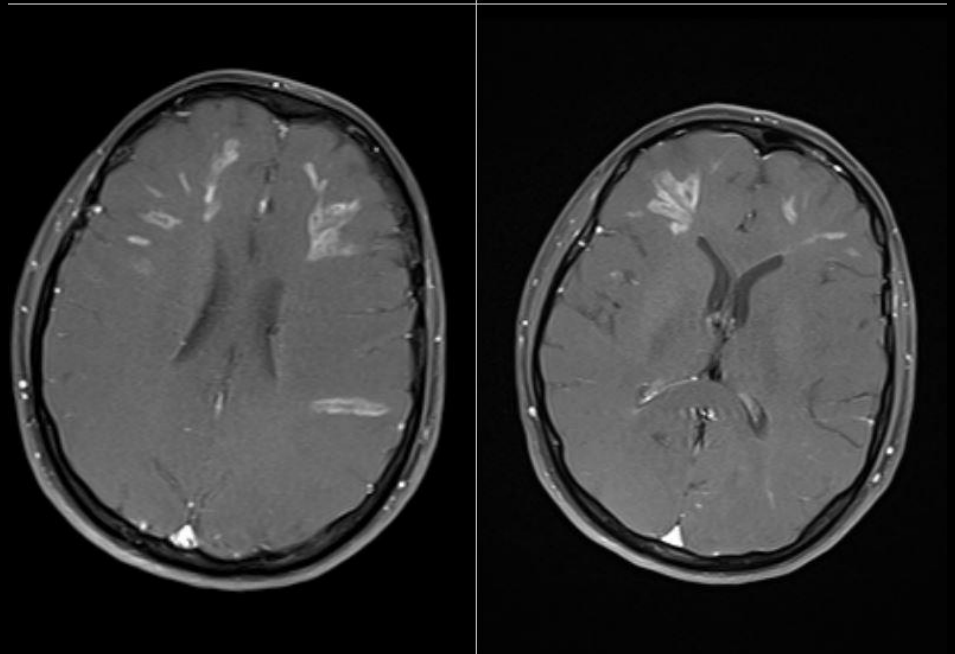

Sc 7
DwiSE/ADC
SL 11
I
A
L
3 cm
ead
FH 7 head
Sc 7
DwiSE/ADC
SL 12
I
A
L
3 cm
FH 13 hea
Sc 7
DwiSE/ADC
SL 14
I
A
L
3 cm
head
FH 25 head
Sc 7
DwiSE/ADC
SL 15
I
A
L
3 cm
FH 30 hea

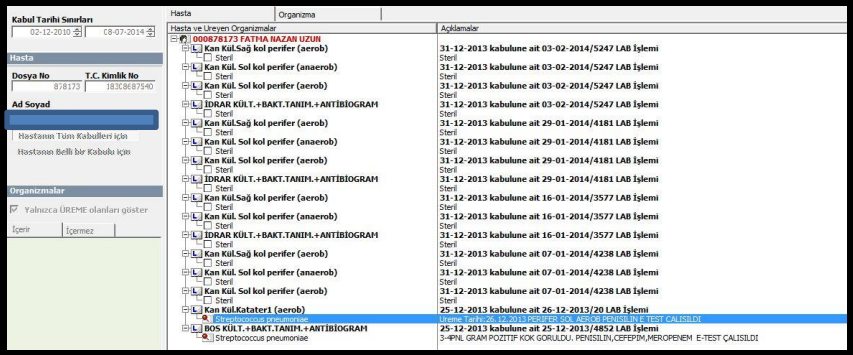
37 y, K, septik tabloda



Bir hafta sonraki MRG



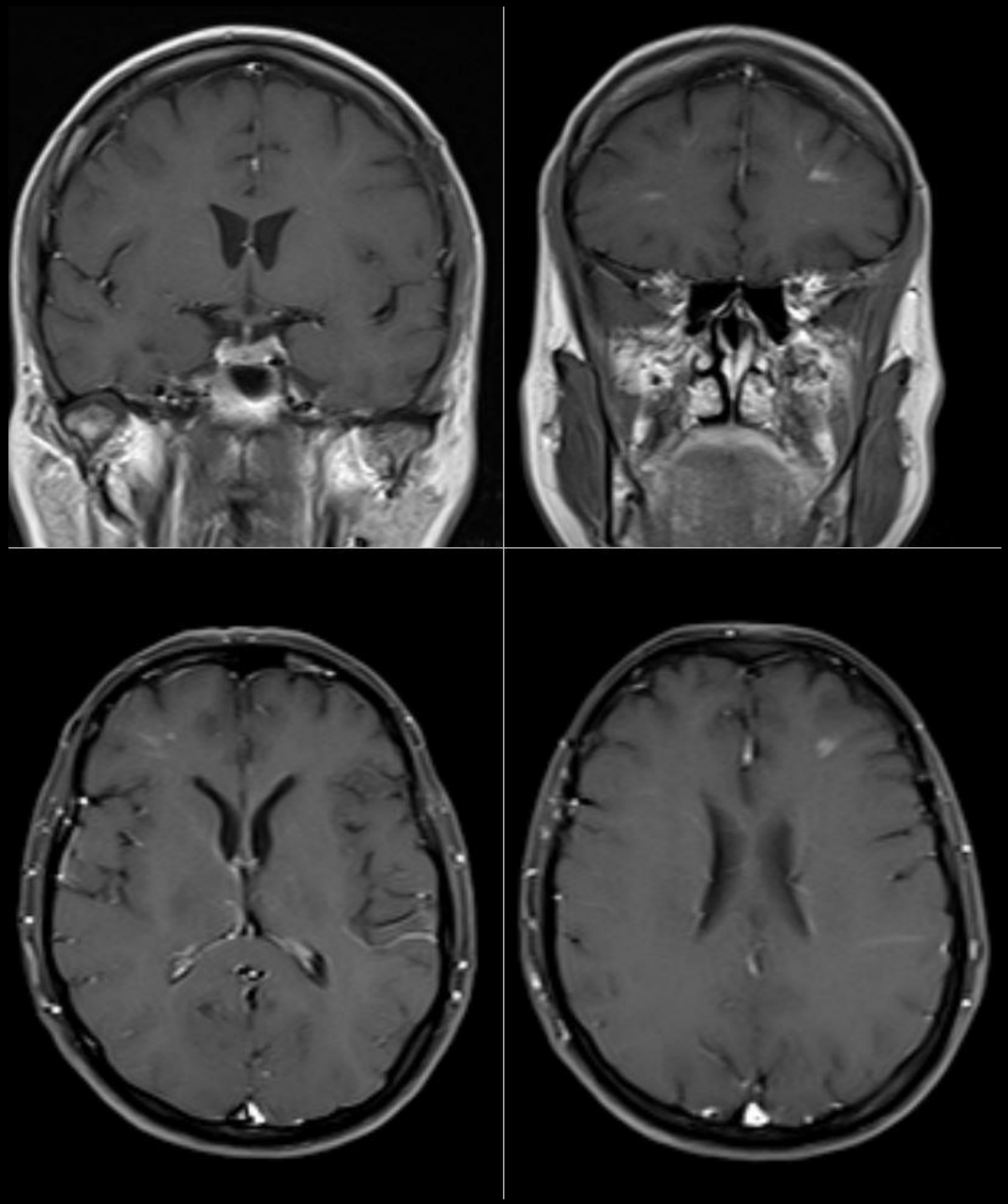




Kan kültürleri: Pnömokok

Septik emboli !!

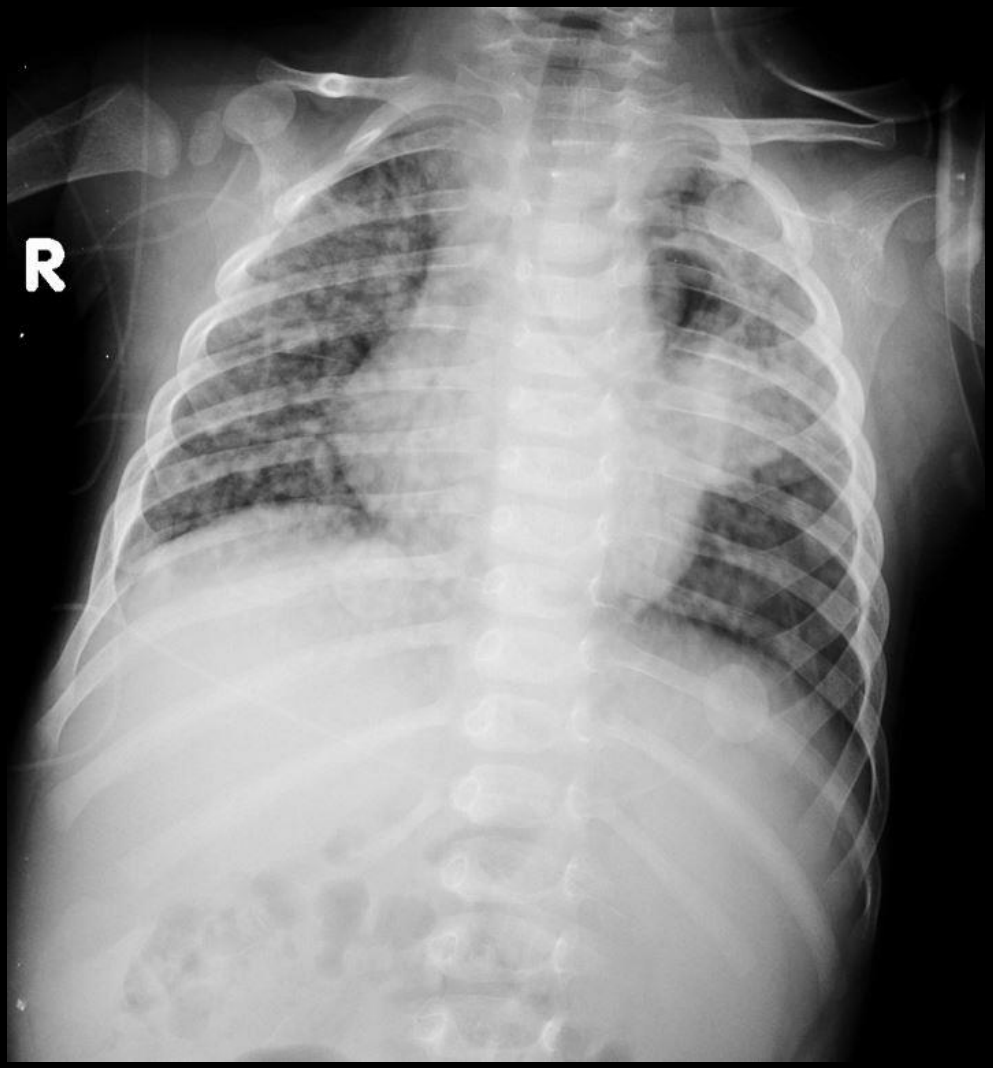
Üç hafta sonraki MRG

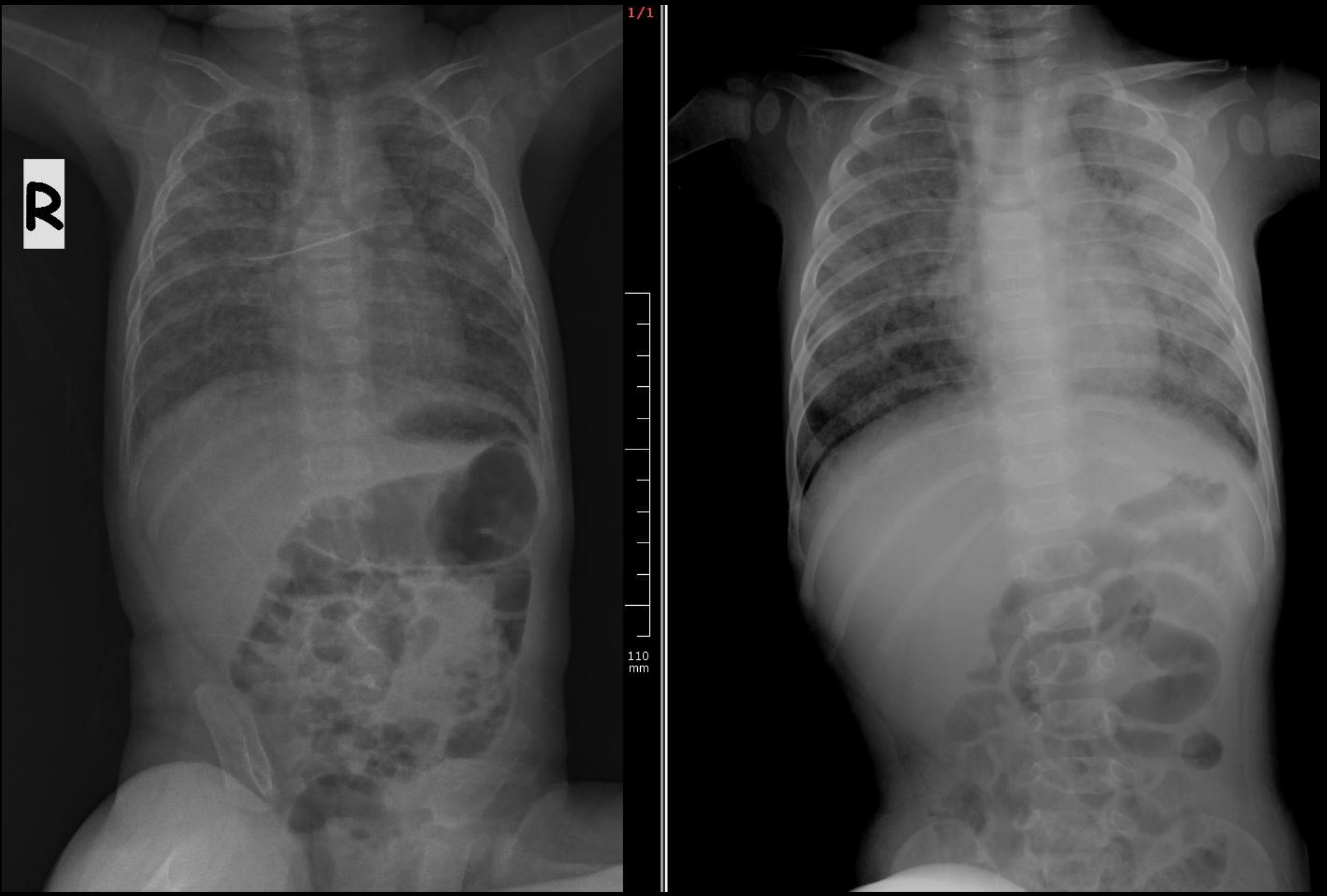


Tüberküloz menenjiti

- Tüm TB olgularında % 5'lere varan SSS yayılımı
- HIV, immün sistem yetmezliğinde sıklığı artar
- Bazal menenjit
- Tüberkülomlar
- Apse formasyonu
- Kronikleşebilir

8 aylık erkek, ateş, genel durum bozuk

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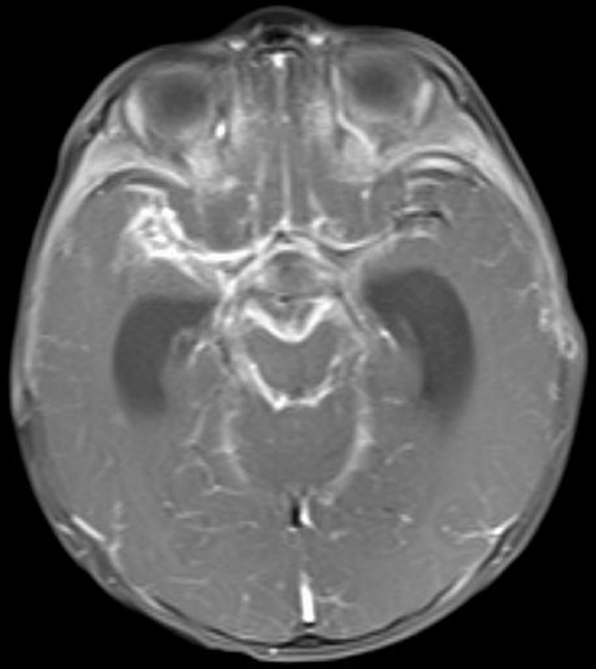
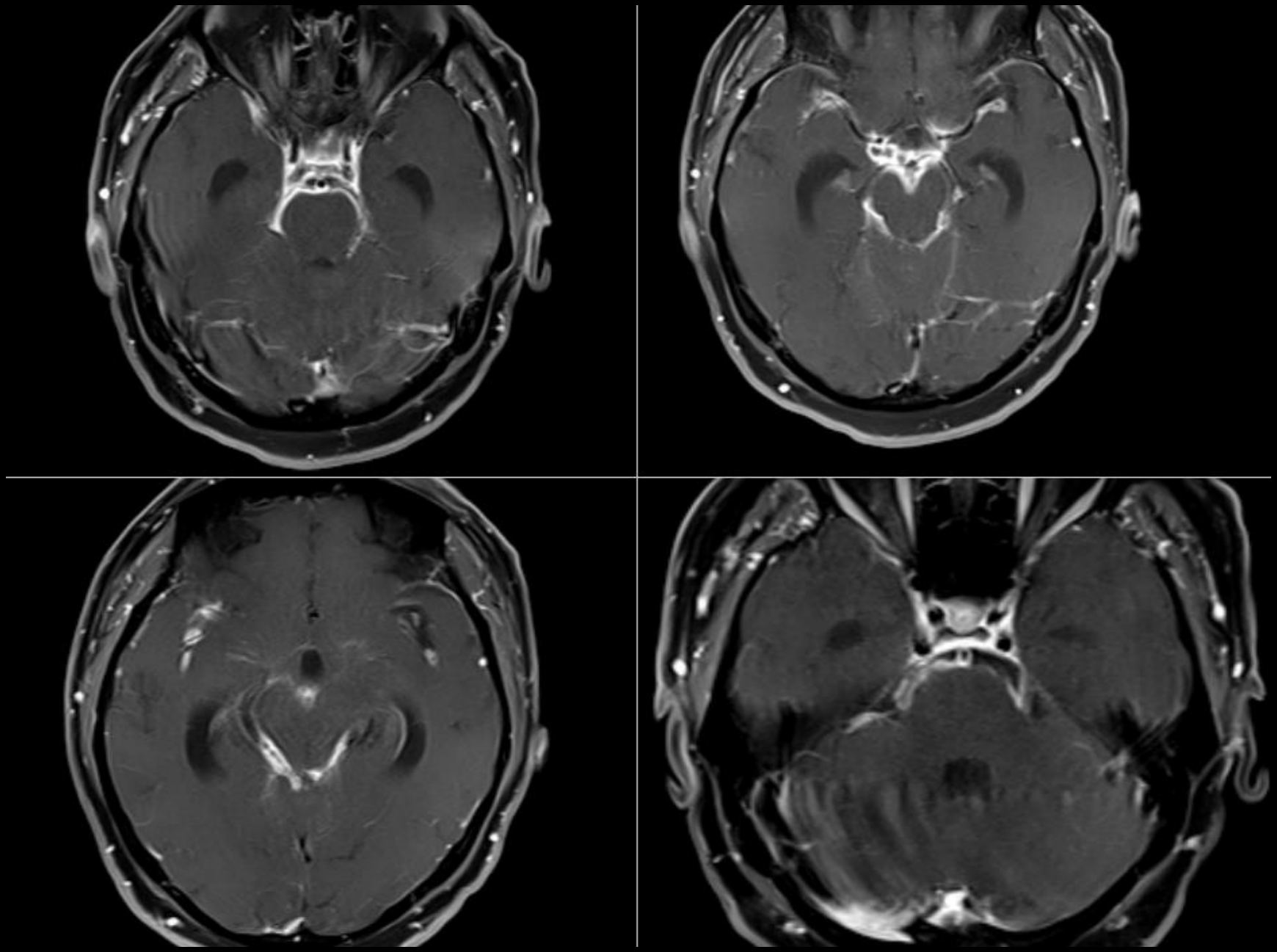
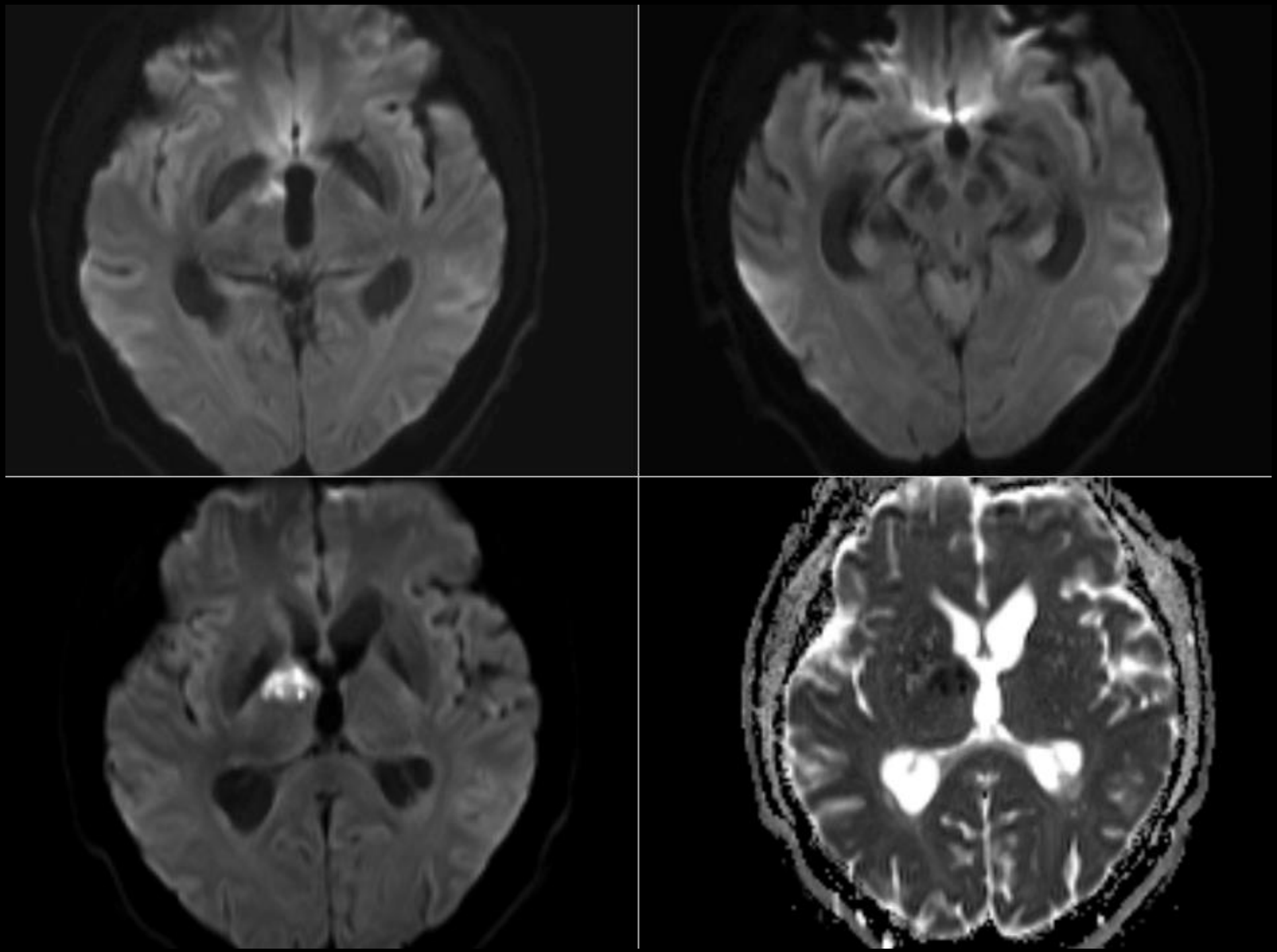
110
mm

Aynı olgu

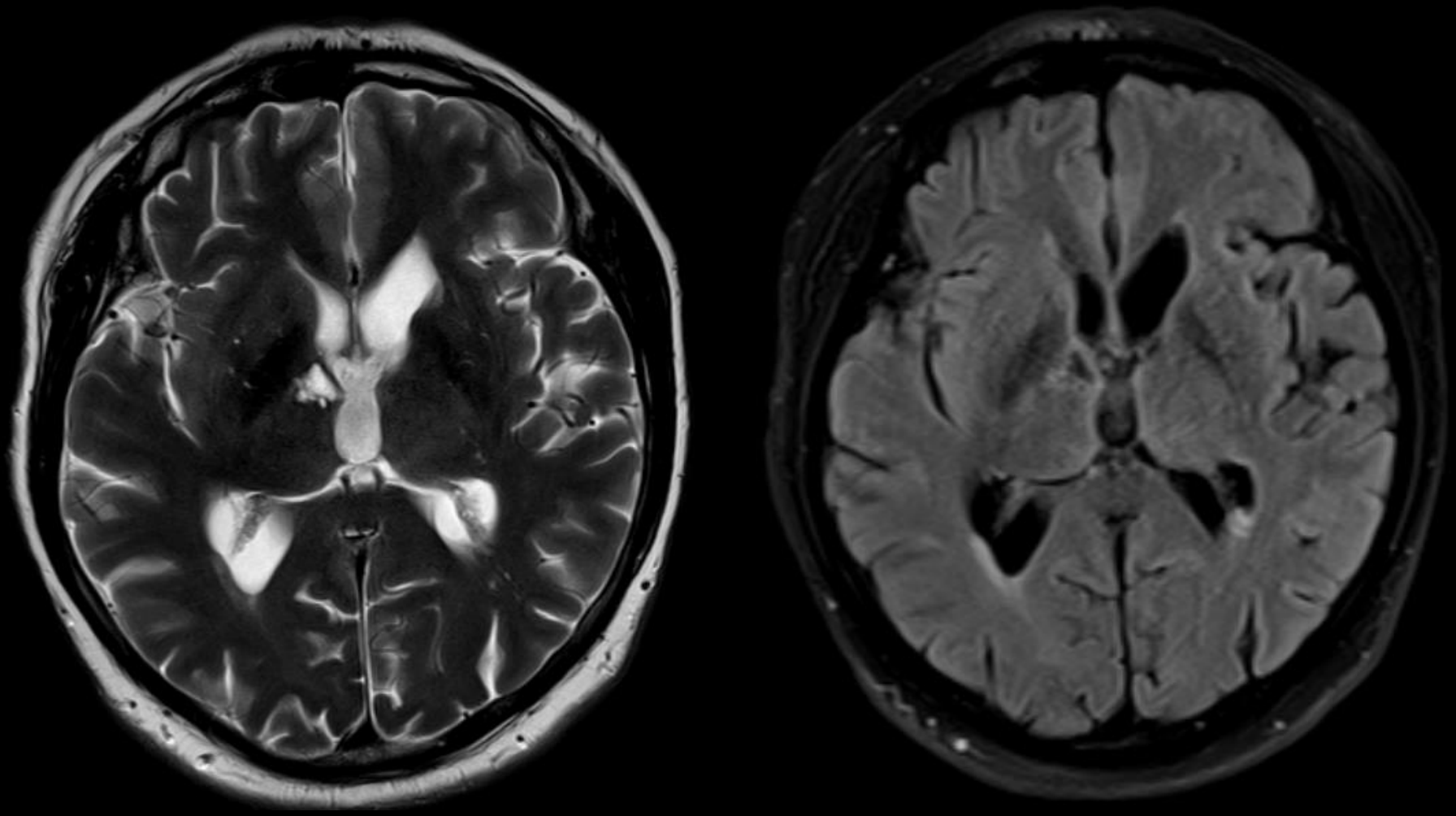


47 yaş, erkek; Tbc menenjit

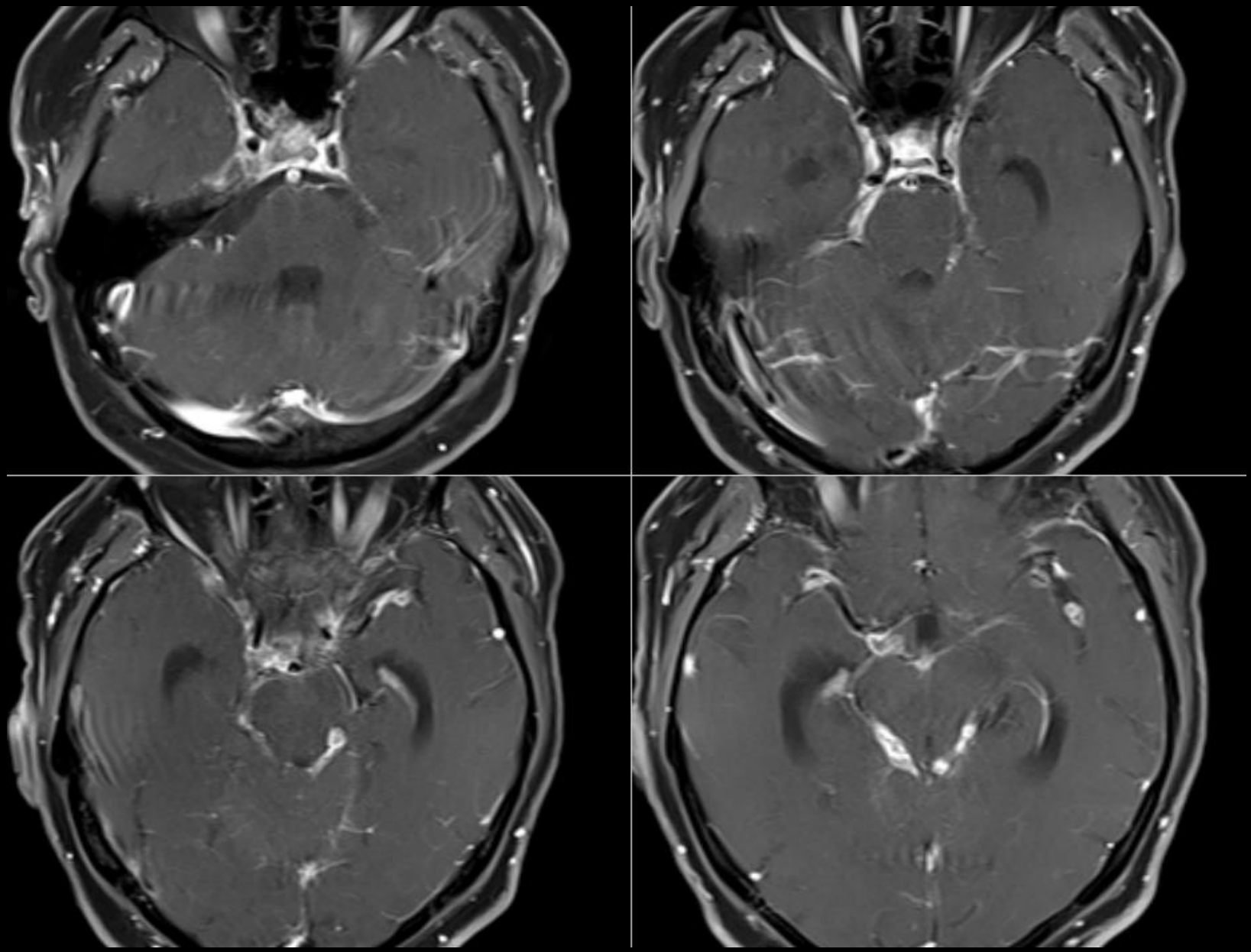




5 ay sonraki takip MRG



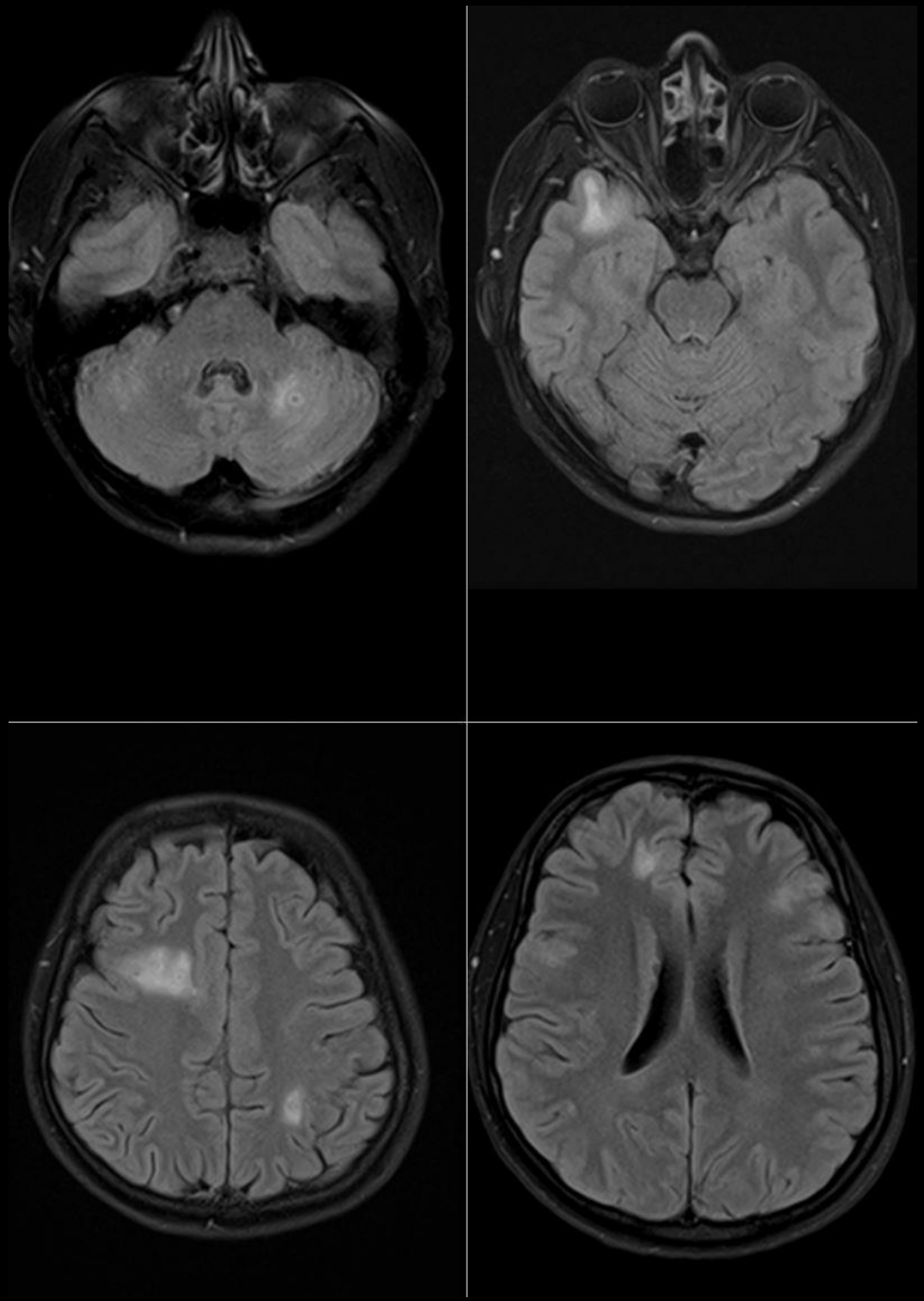
5 ay sonraki takip MRG

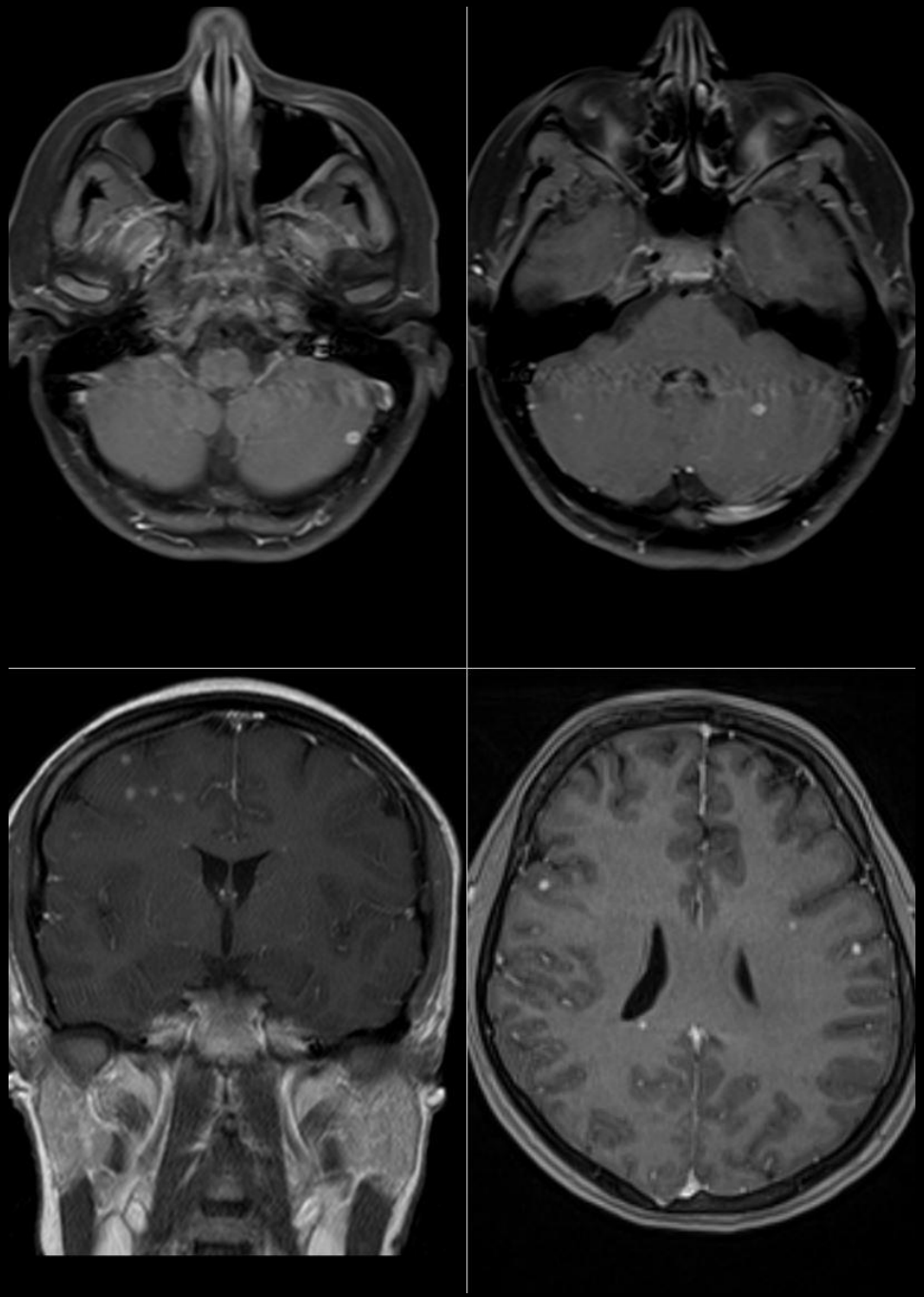


28 y, K

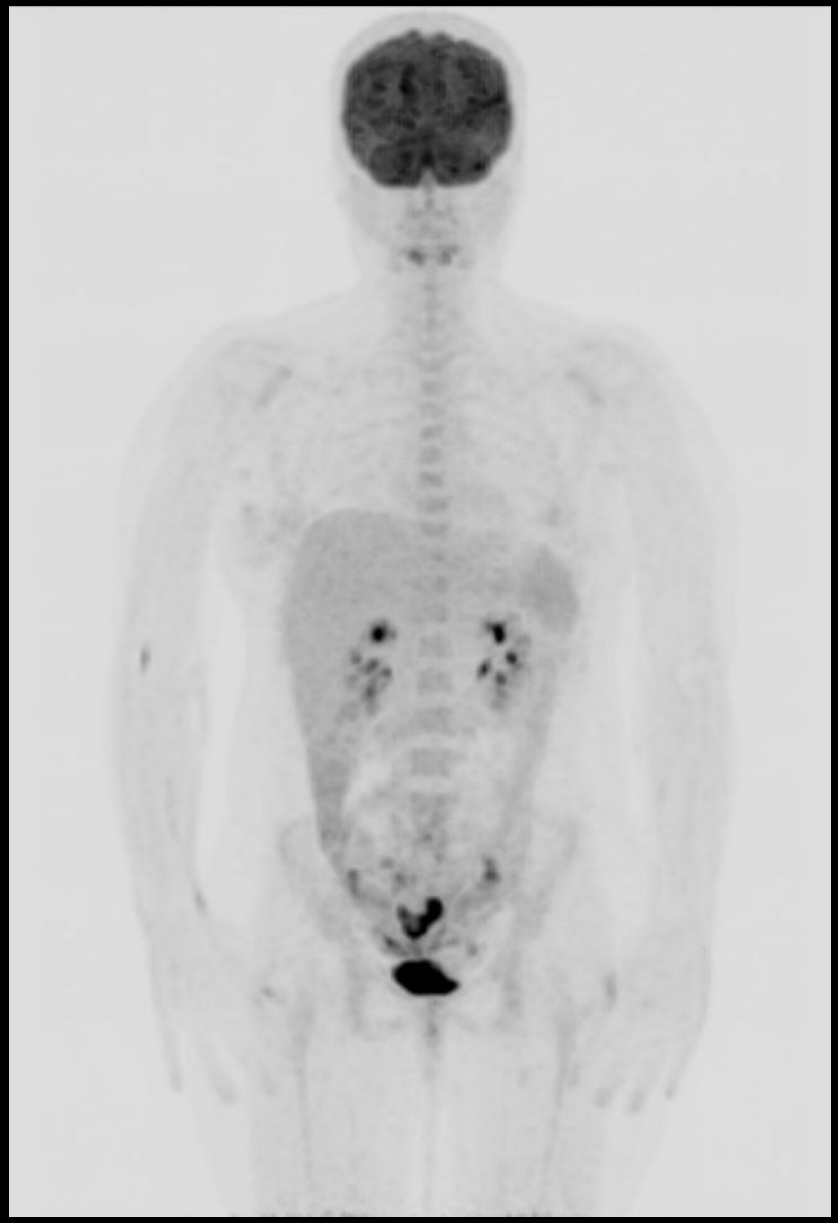
Olgu geçmişi

BAS AGRISI BILINC DEGISIKLIGI OLAN HASTA BT RAPORUNDA SEREBRAL VE SEREBELLAR SUBKORTIKAL YERLESIMLI KONTRAST TUTAN LEZYONLAR,LEZYONLARDA DIFUZYON ISITLILIGI YOK,GRANULAMATOZ HAST.? MENEGIOM? MET? FRONTAL LOB VE SEREBELLAH HEMISFERDE MILIMETRIK HIPERDENS ALANLAR BULUNDURAN HIPODENS ALANLAR IZLENDI BILINC DEGISIKLIGI MEVCUT ACIL KONTRASTLI MR CEKILMESI RICASIYLA I67.9-SEREBROVASKULER HASTALIK, TANIMLANMAMISR11-BULANTI VE KUSMA

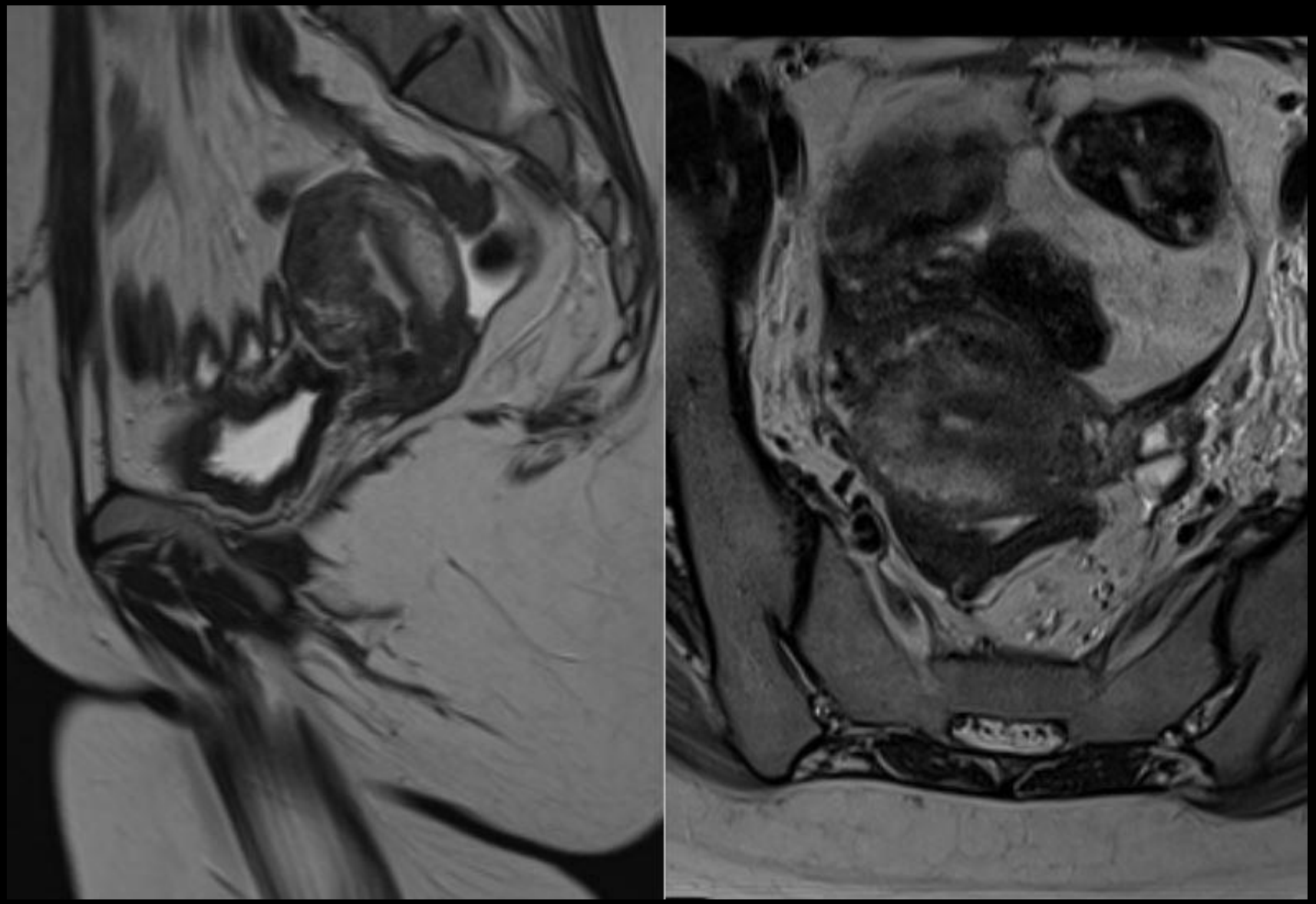




- 1 ay önce sezaryen,
- Annede Tbc öyküsü
- Süt ürünleri satma (peynir vs)



Abdominal İncelemede:
Uterusta endometrial alanda malignite düzeyinde yoğun hipermetabolik yumuşak doku dansite alanı izlenmiştir (SUVmax: 22, MR ve diğer bulgularla birlikte değerlendirme önerilir). Bilateral over lojunda FDG tutulumu izlenmiştir (SUVmax: 9, fizyolojik/patolojik ayrımı net yapılamamıştır). Pelviste karın ön duvarı posteriorunda lineer hipermetabolik dansite alanı izlenmiştir (SUVmax: 10, operasyona sekonder değişiklik? takibi önerilir). Karın ön duvarında hipermetabolik değişiklikler izlenmişitir (SUVmax: 11, operasyona sekonder değişiklik?). Safra kesesinde hiperdens alan izlenmiştir (taş?). Abdominal bölgede karaciğer, sürrenal gland, lenf nodları ve diğer alanlarda patolojik FDG tutulumu izlenmemiştir.



- Küretaj, sitoloji, kültür…
- TANI ???

- Küretaj, sitoloji, kültür…
- TANI ???
- Endometrial kavite Tbc !!

Serebrit ve Apseler

- Büyük kısmı bakteriyel
- Sinüsler, mastoid hücreler, diş köklerinden direkt yayılım
- Hematojen yayılım (endokardit, pnömoni, karın içi enfeksiyonlar …)
- Travma & cerrahi sonrası

Serebrit → Apse

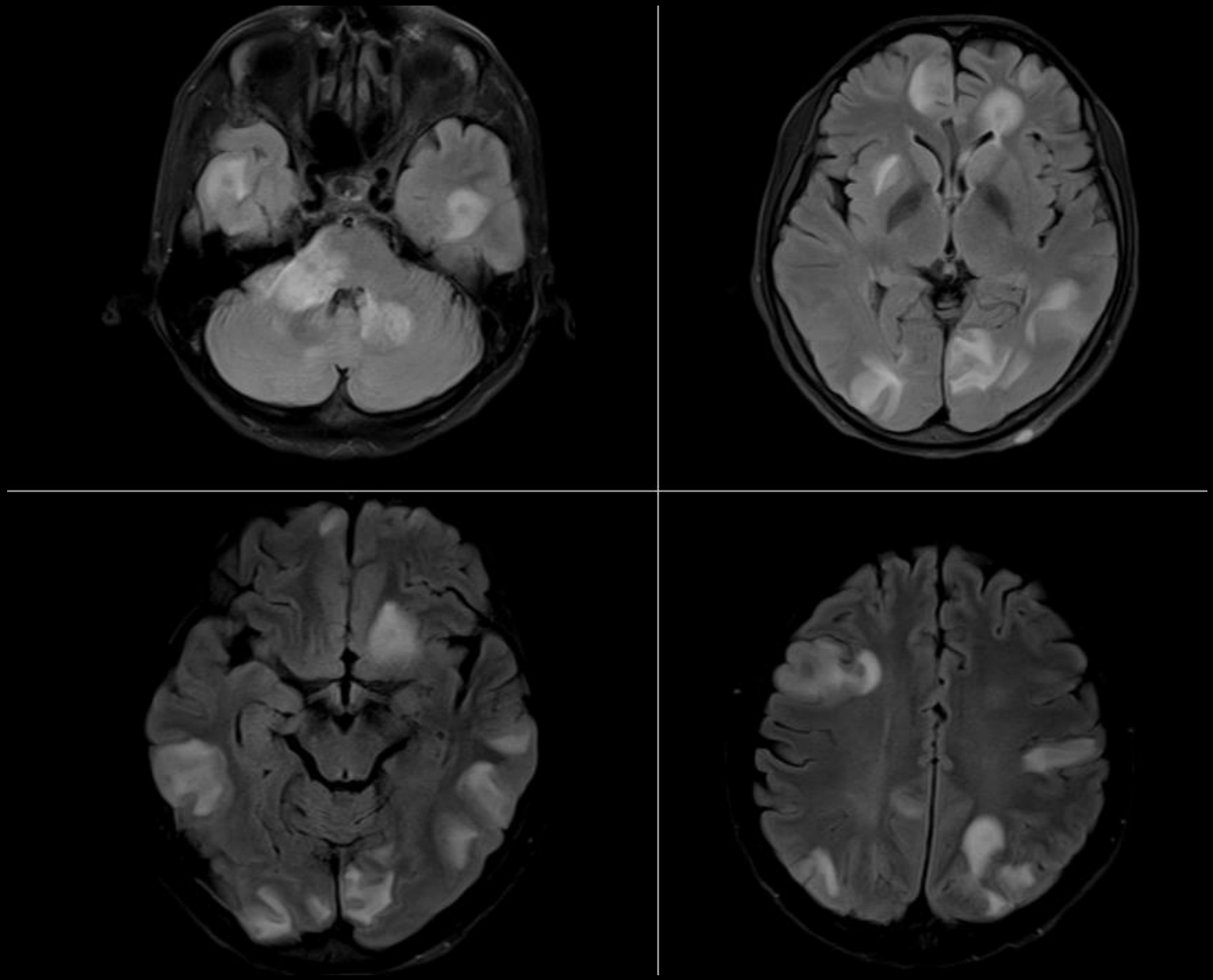
- İlk 7 gün: Erken serebrit
  - T2 ve difüzyonda intensite artışı
- 7- 10 gün: Geç serebrit
  - Vazojenik ödem oluşumu
  - Kontrast tutulumu (heterojen/çevresel)

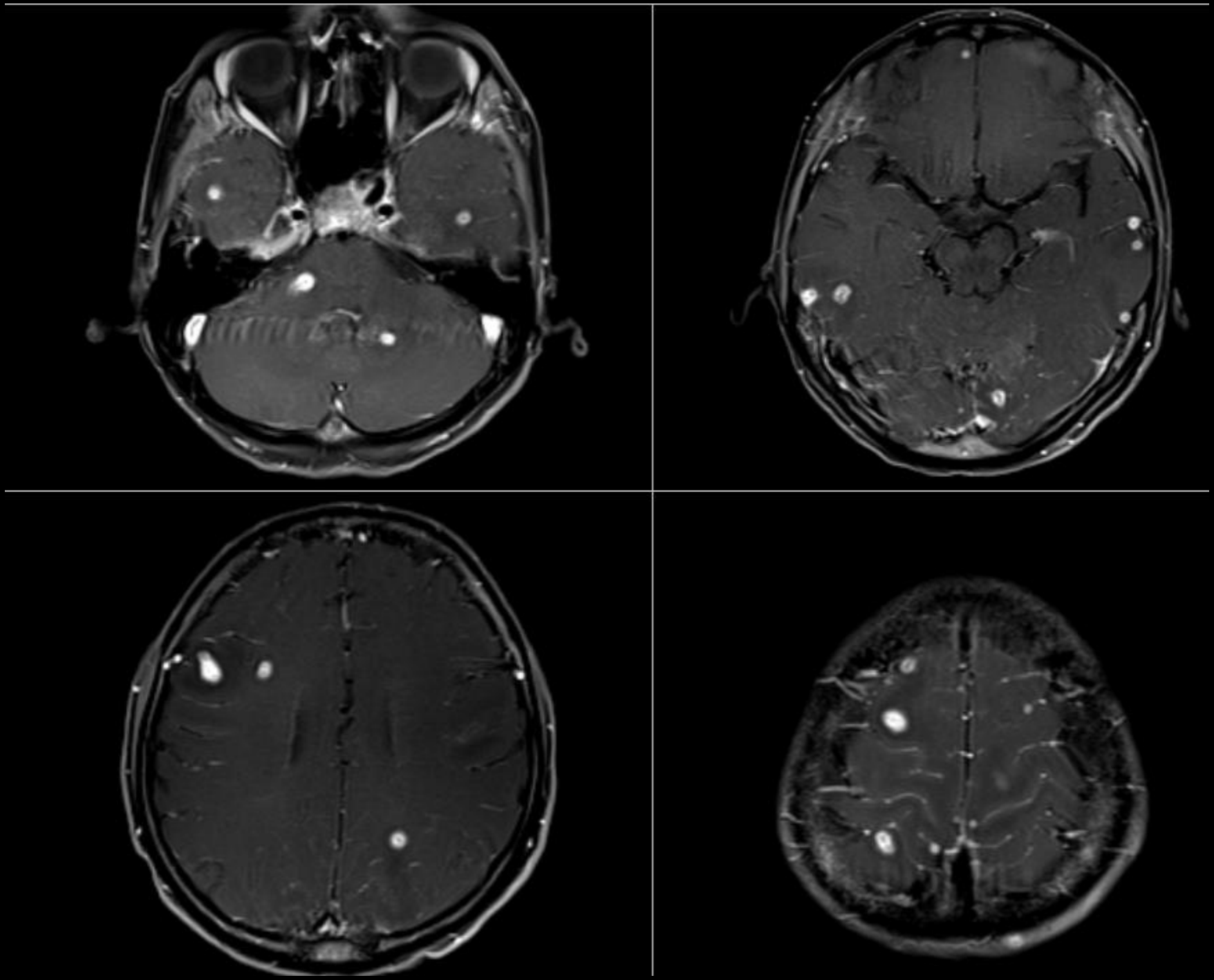
Serebrit → Apse

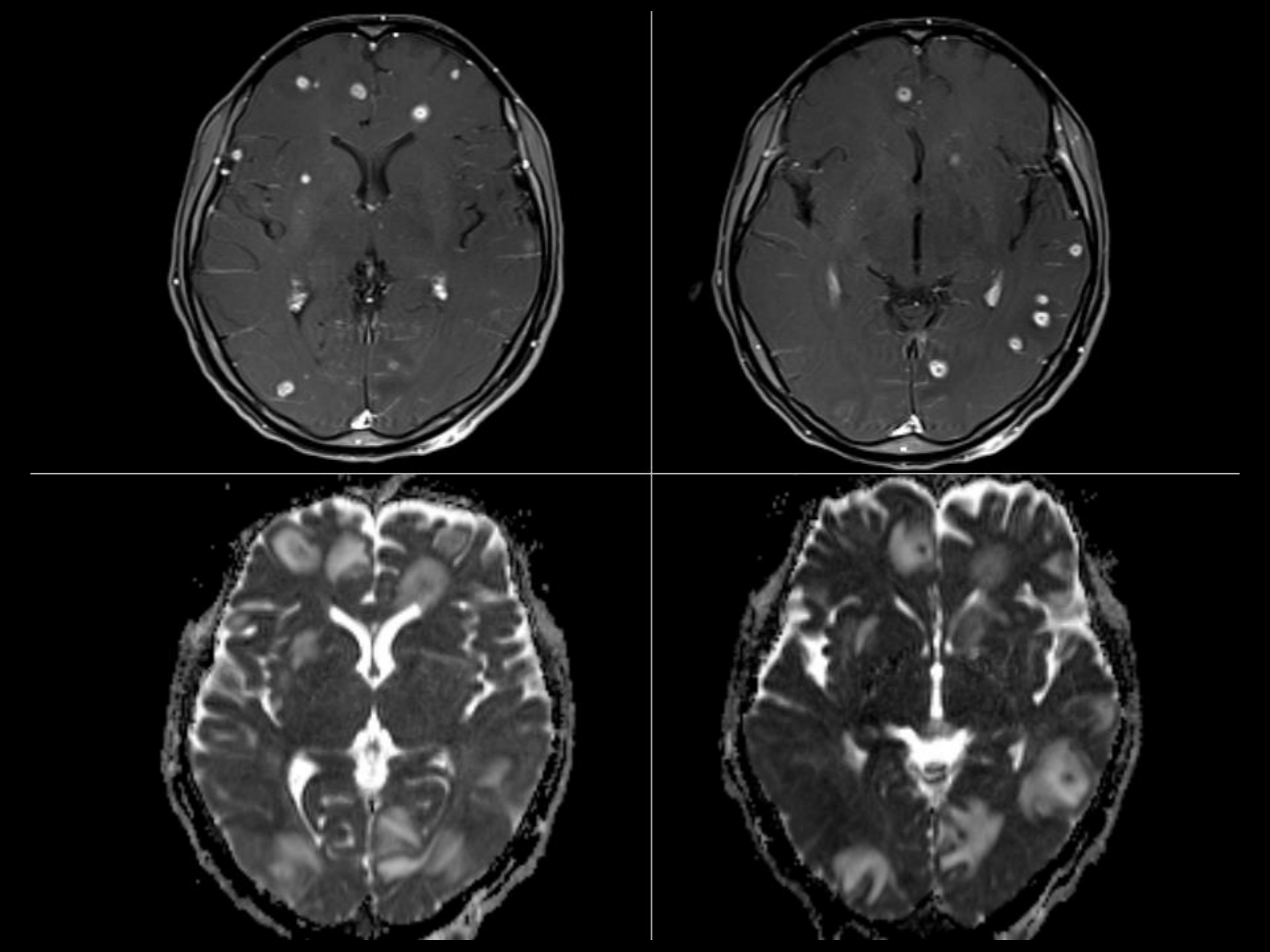
- 10-14 gün: Erken apse formasyonu
  - Kapsül enhansmanı
  - Pürülan materyal birkimi (difüzyonu kısıtlı !!)

- Olgun apse: Kapsül belirgin
  - T2 düşük; T1 hafif parlak
  - Homojen çevresel enhansman

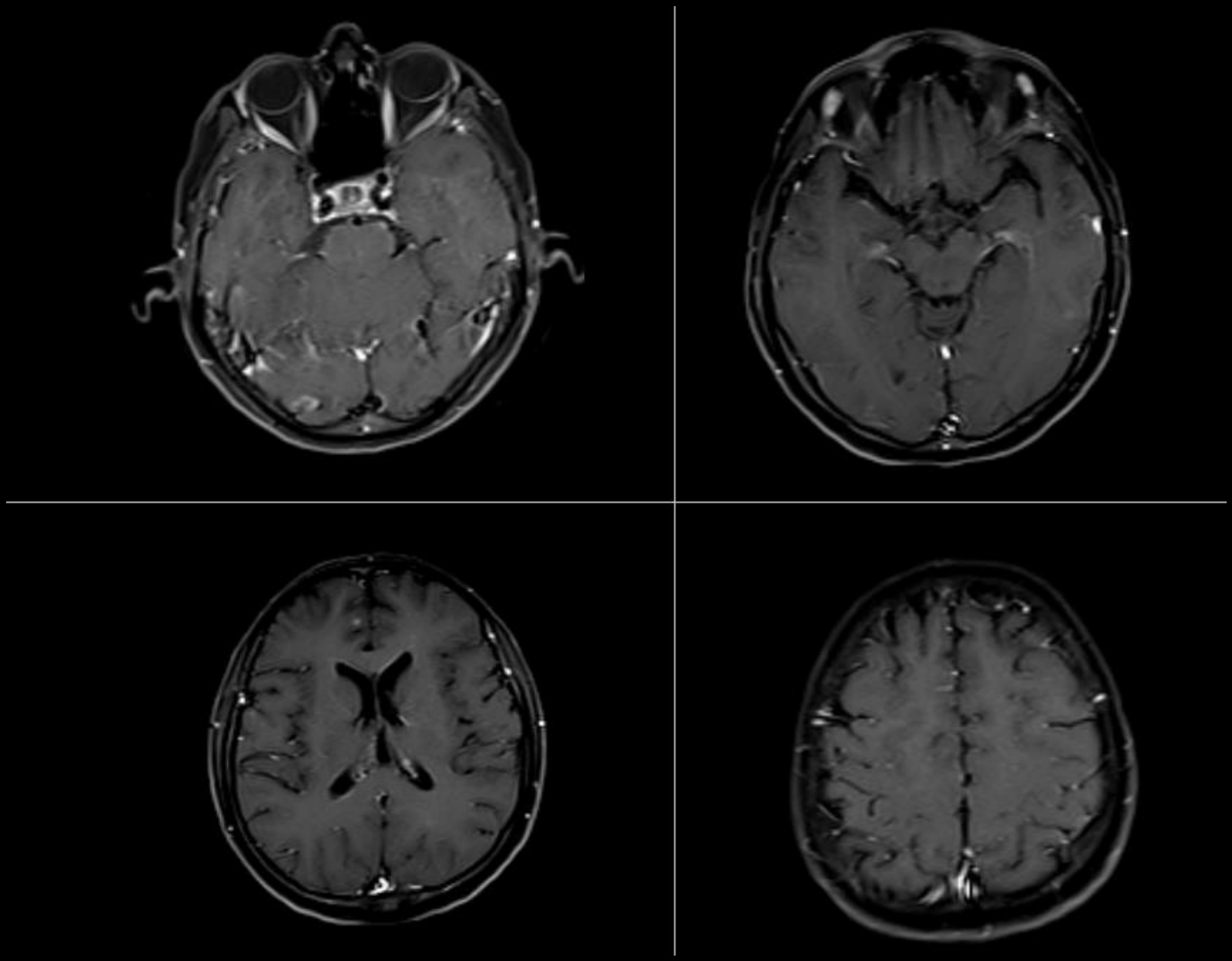
47y, K, kombine immün yetmezlik



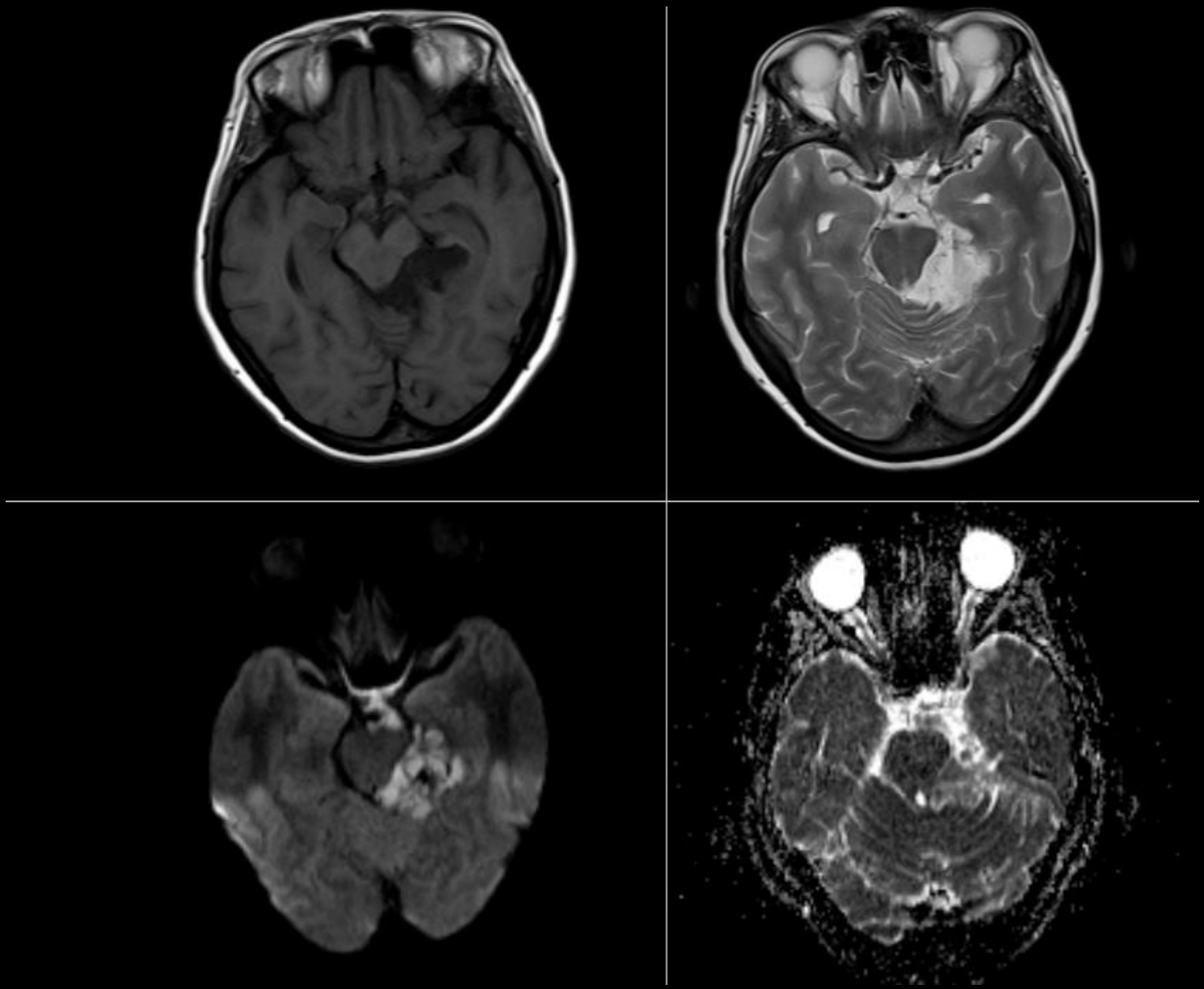


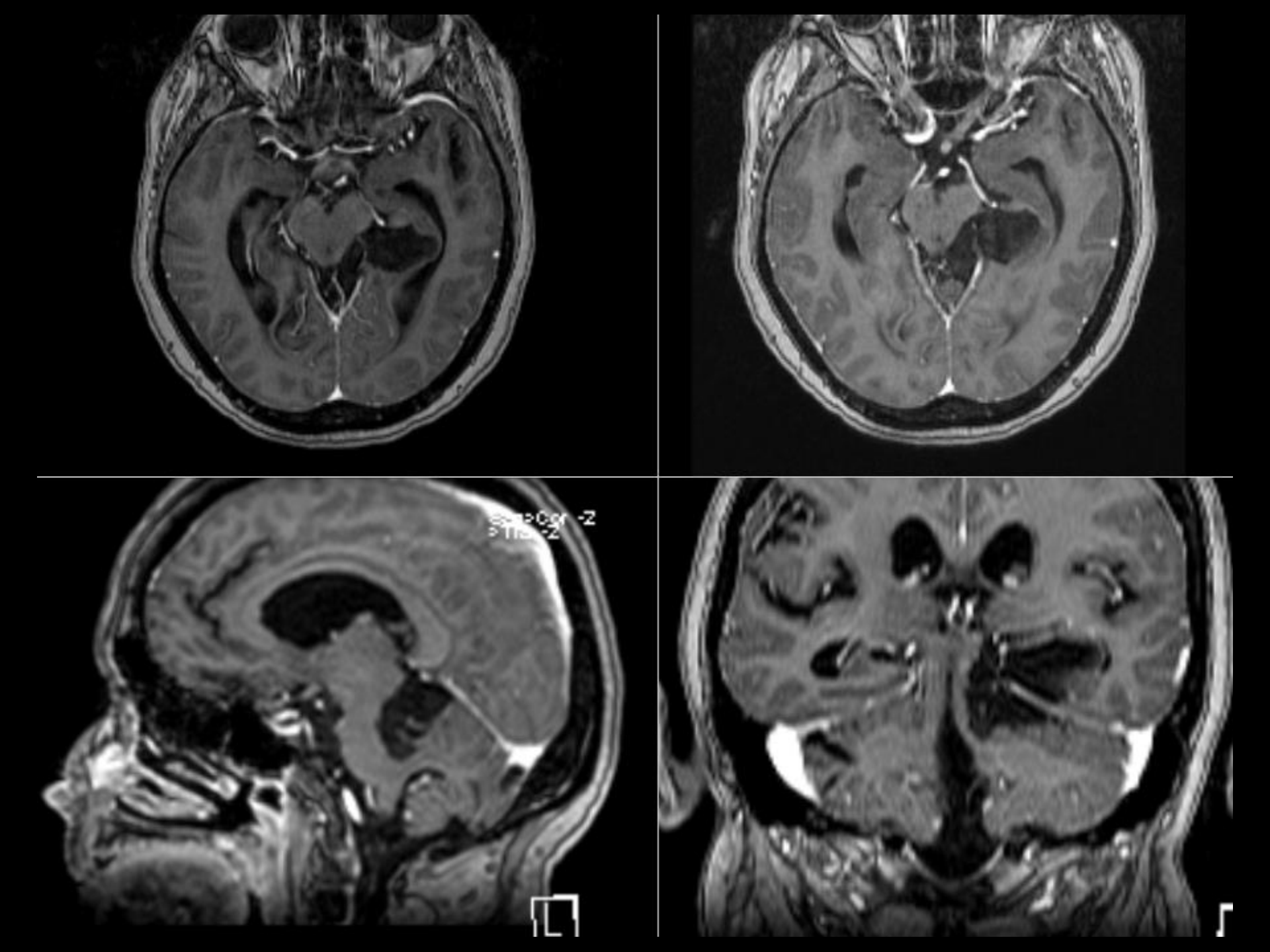


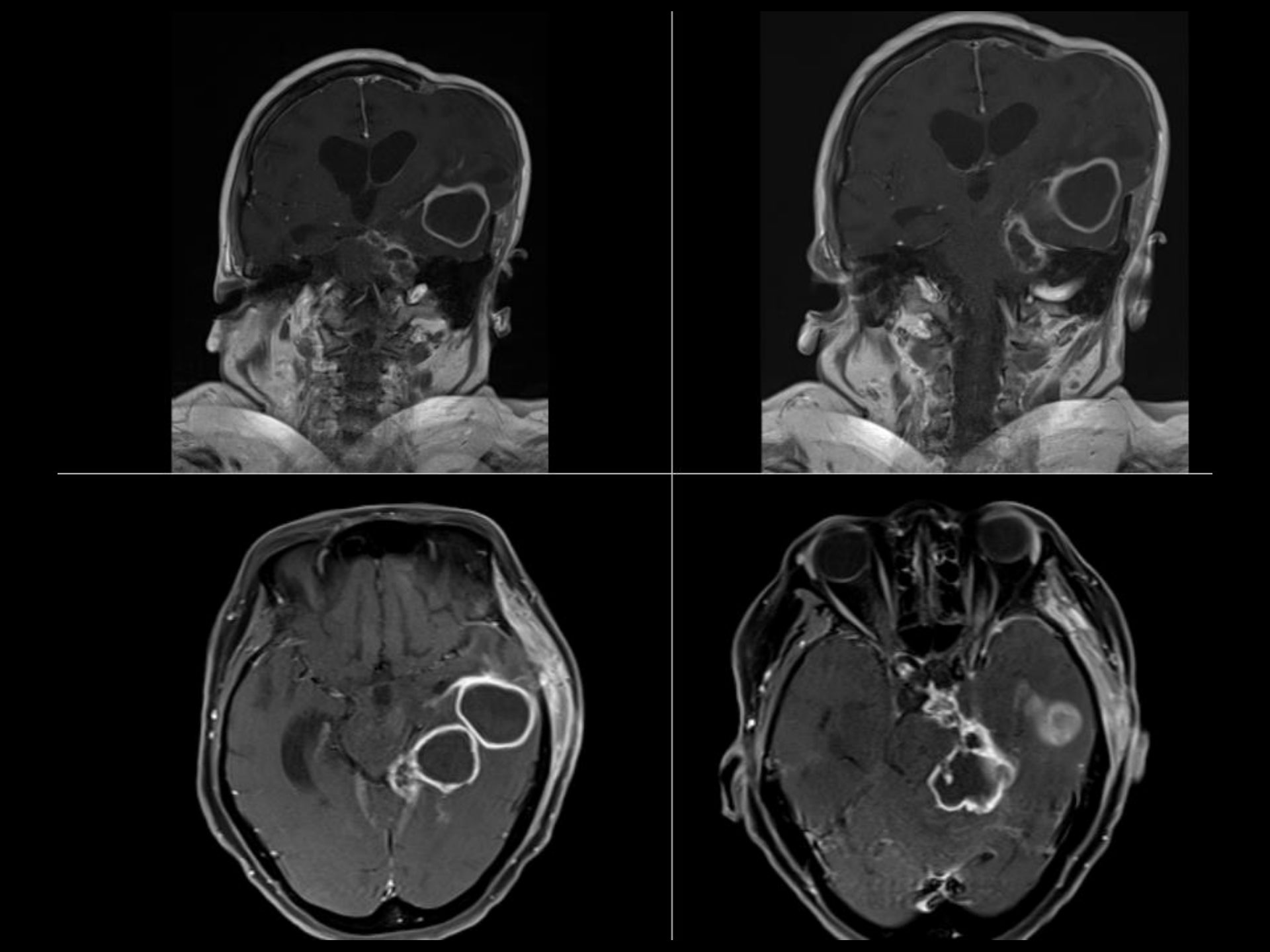
Antibiyoterapi, 1 ay sonraki MRG

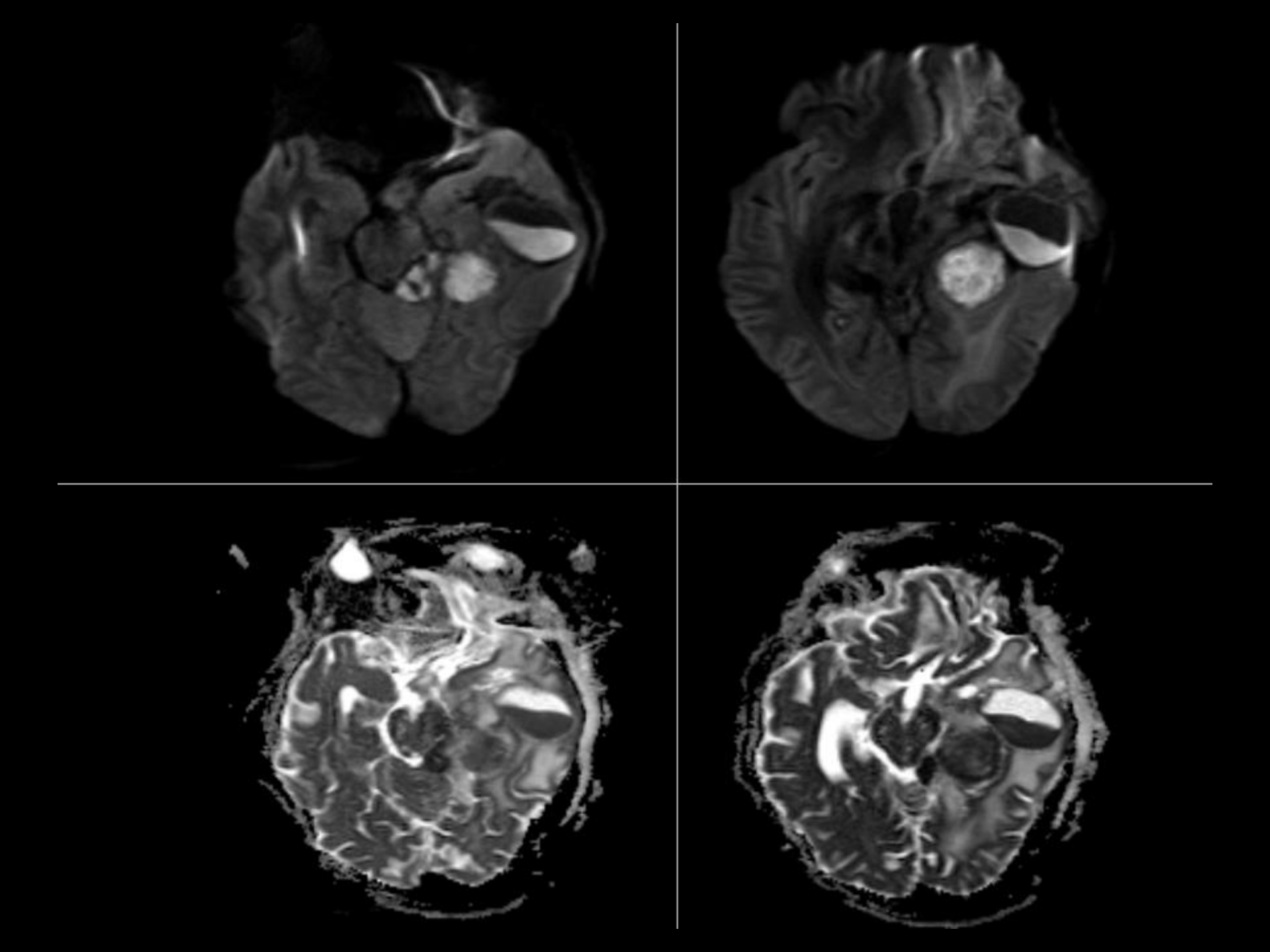


57 y, K, ??









Apse mi tümör mü??

- Spektroskopide apsede 0.9 ppm' de Valin ve lösin artar
- DTI bulguları: Kapsül özellikleri farkı ortaya konabilir
- Fraksiyonel anizotropi (FA) apse kavitesinde artar

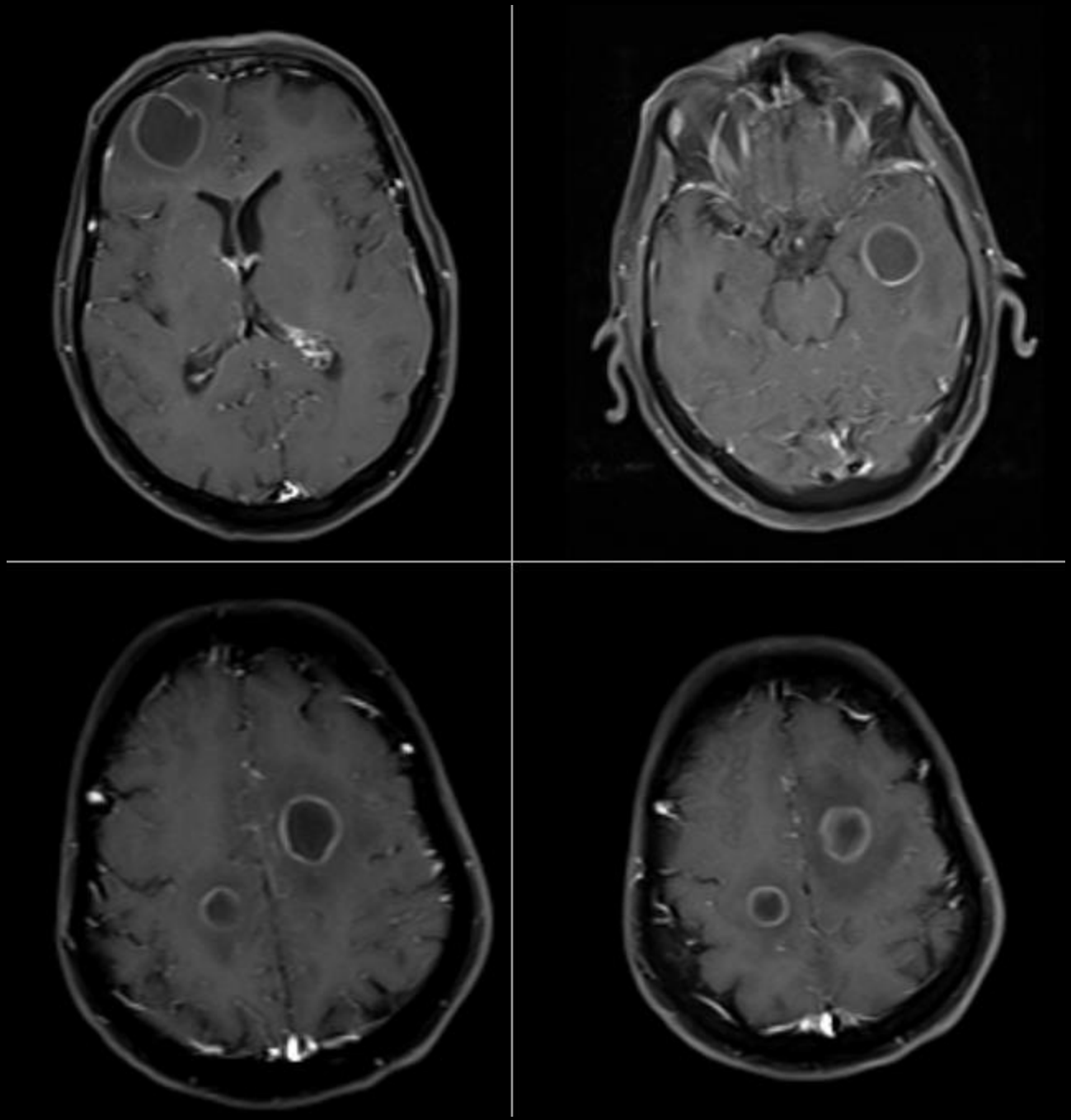
Apse mi tümör mü??

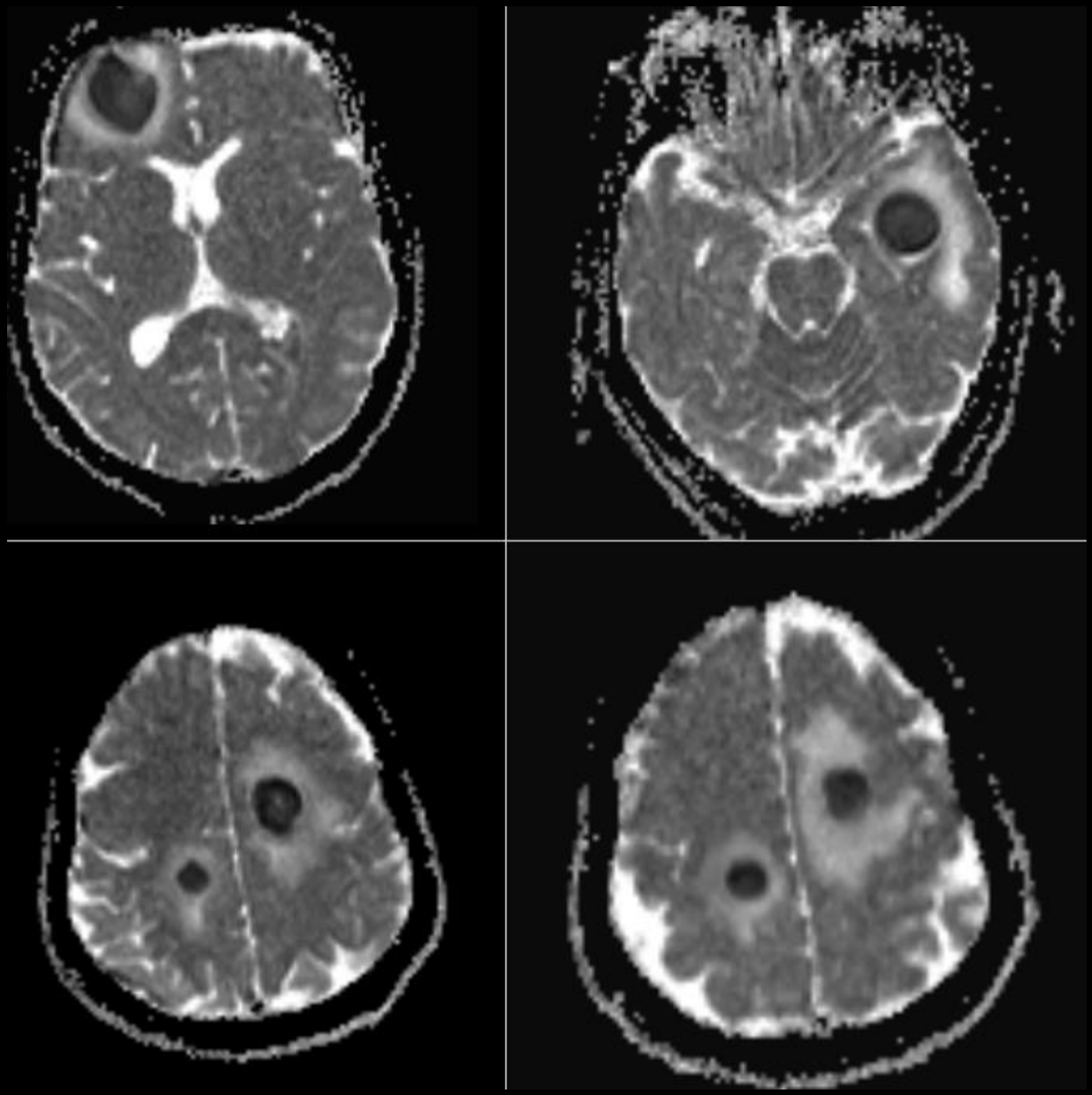
- Duvar: Apsede düzgün, tümörde düzensiz

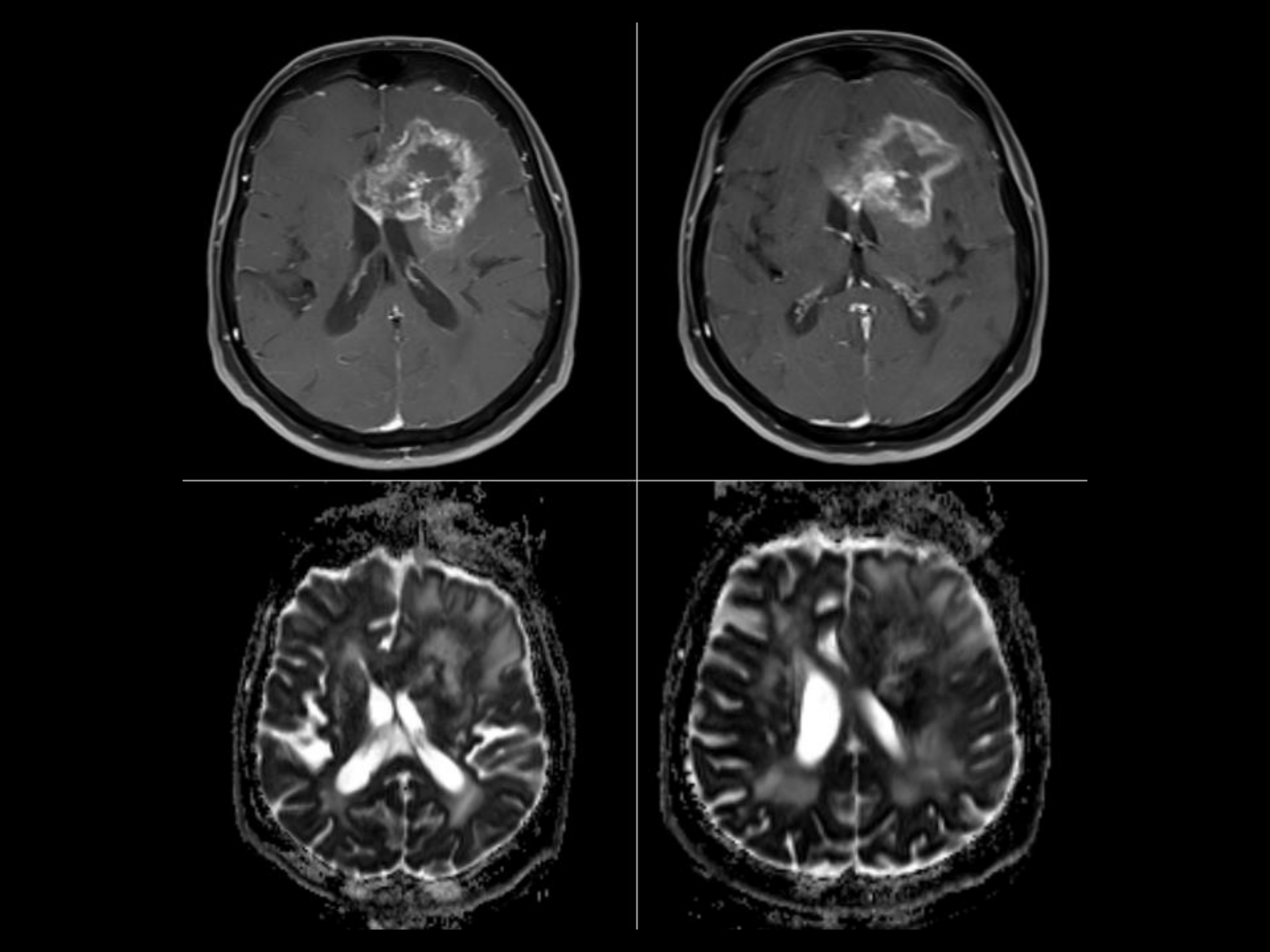
- Difüzyon: Pürülan materyalde kısıtlı (apse)
- Difüzyon: Kapsülde kısıtlı (tümör)

- Perfüzyon: Apsede kapsülde rCBV artmaz,
  Tümörde artar

- Spektroskopi: Apsede aminoasitler artar







Ensefalitler

- Serebral parankimde enfeksiyöz süreç
- En sık viral (HSV tip 1 ve 2)
- Postenfeksiyöz (ADEM)
- Subakut ensefalitler/yavaş virüs enfeksiyonları (CJD, prion …)

Herpes ensefaliti

- Erişkinde tip 1, yenidoğanda tip 2 daha sık etken

- Reaktivasyon (trigeminal veya olfaktor sinir yolu ile)

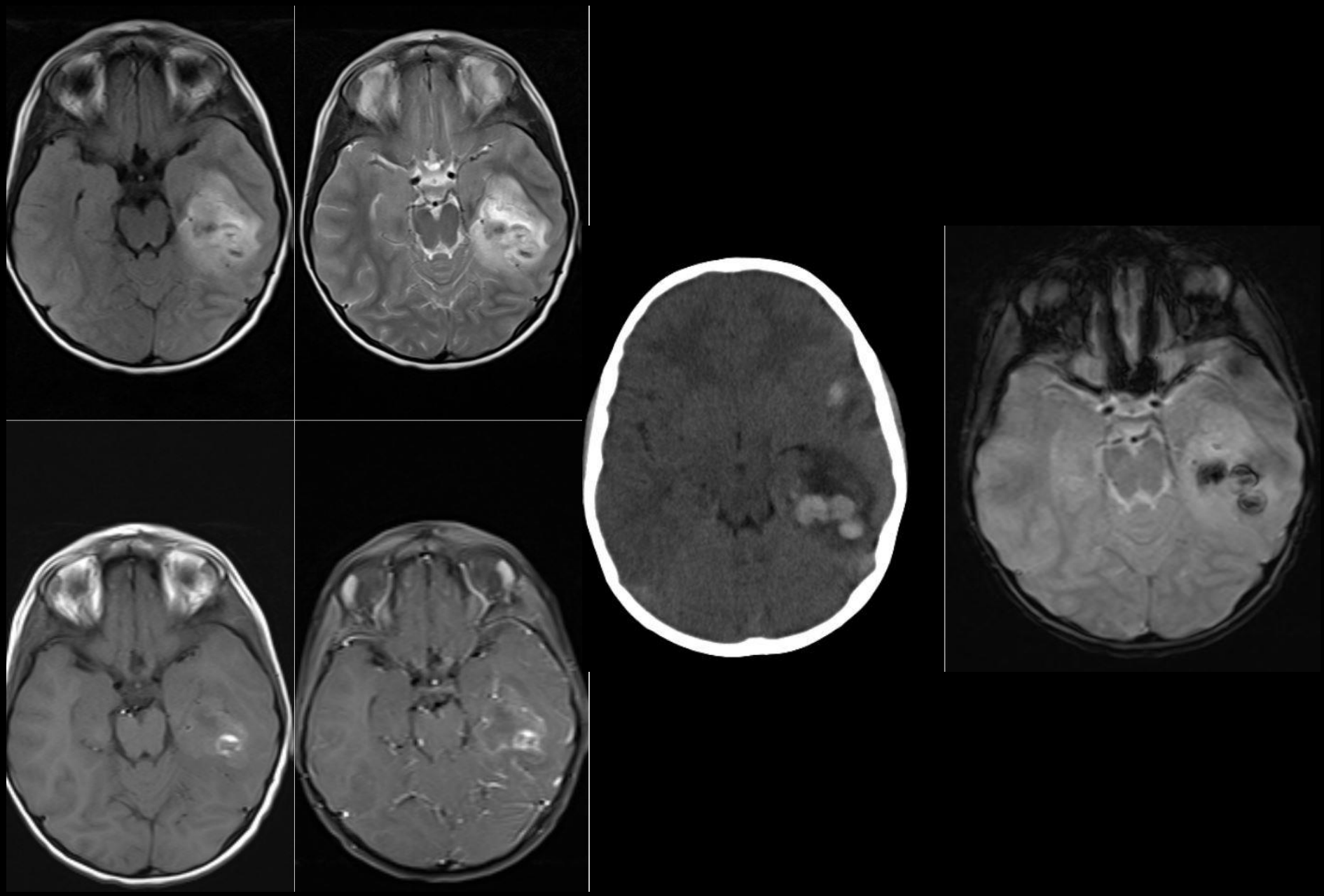
Herpes ensefaliti

- Temporal lob / hipokampal bölge
  - Asimetrik tutulum / Bilateral asimetrik
- İnferior frontal (orbital giruslar, girus rektus)
- İnsula
- Singulat girus

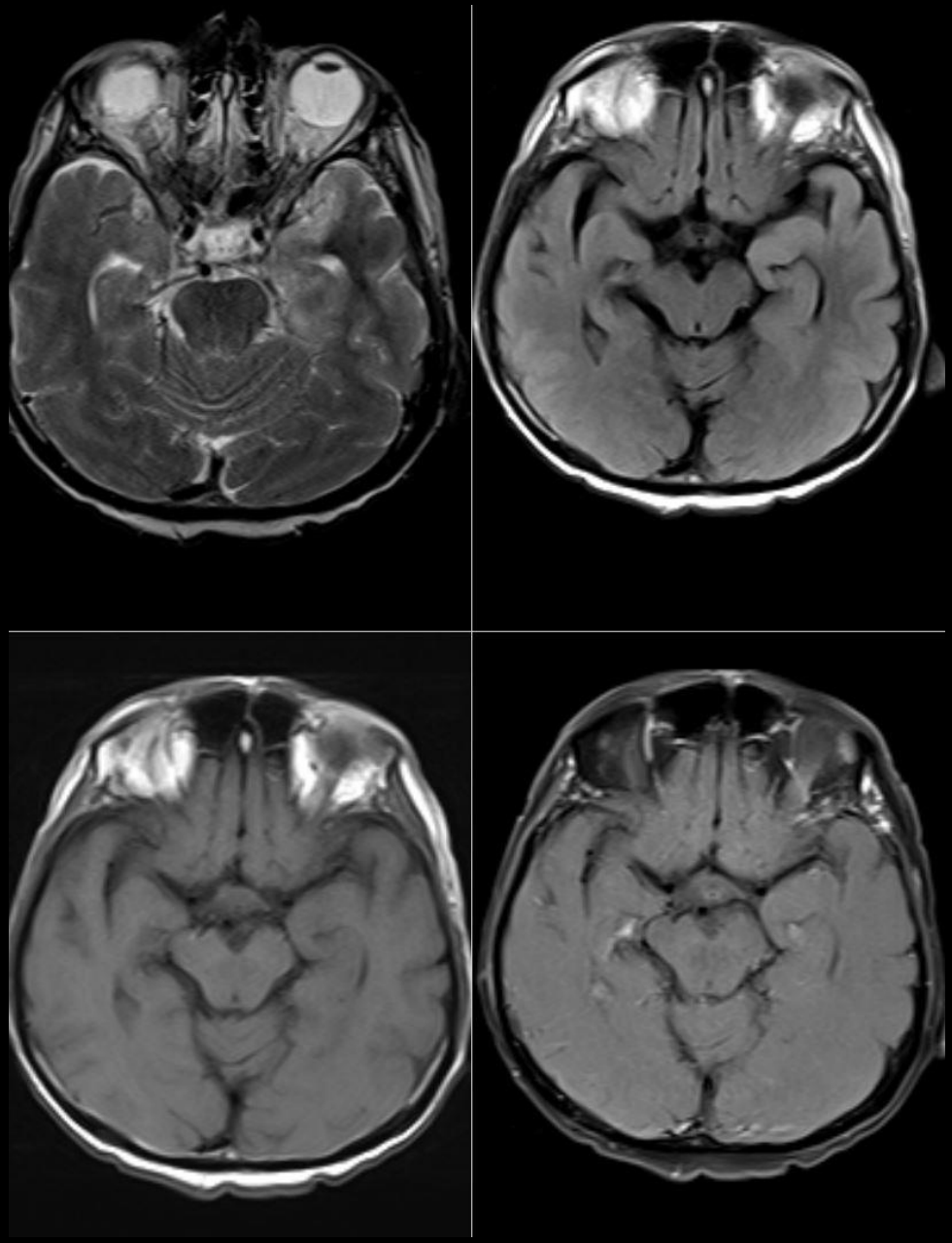
Herpes ensefaliti

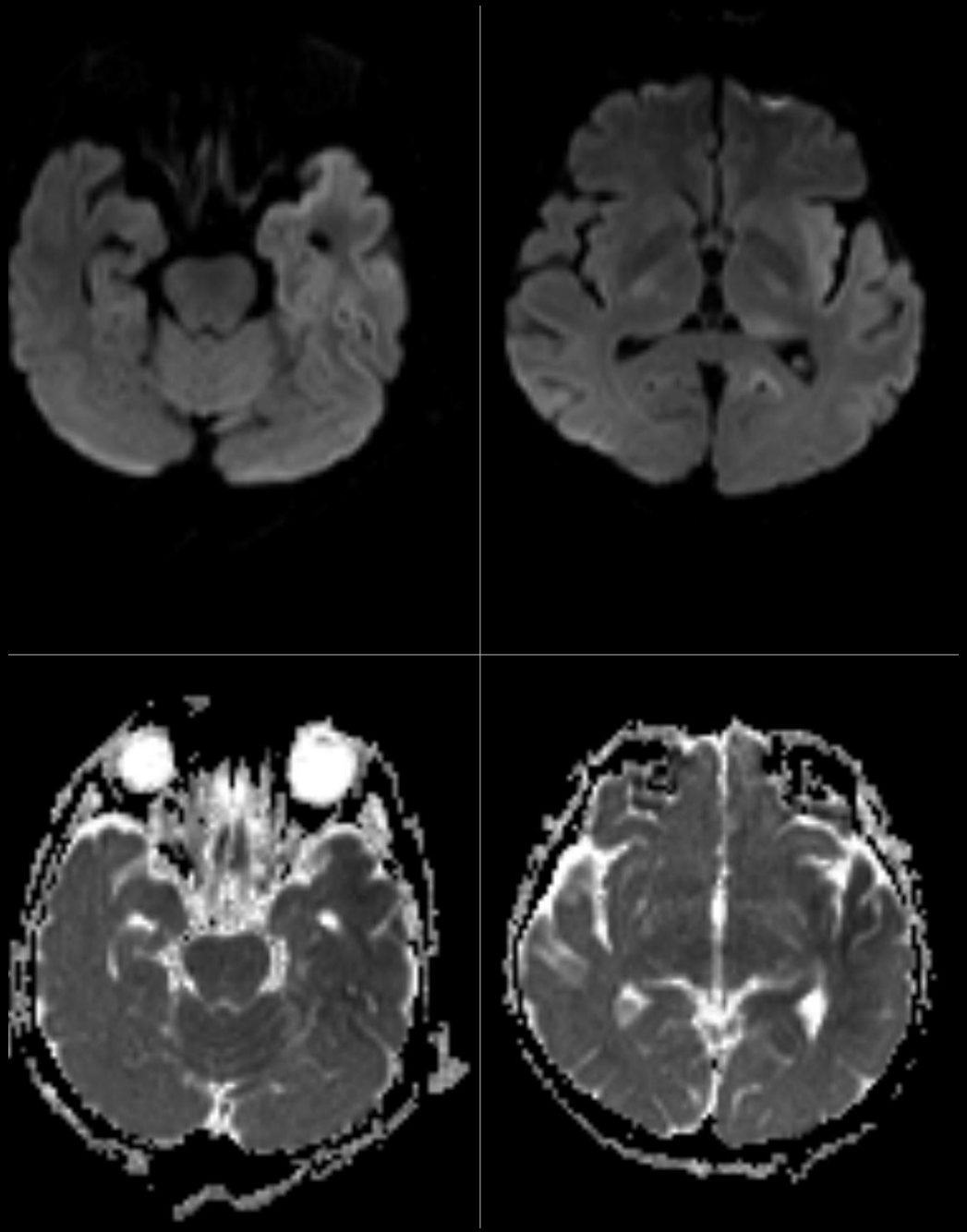
- Bazal ganglia tutulumu yoktur
- Takipte peteşial hemorajik odaklar
- Difüzyon !!
  - Sitotoksik (ADC düşük) kötü prognoz?
  - Vazojenik (ADC yüksek) iyi prognoz?

12 y , E, uykuya meyil, ateş

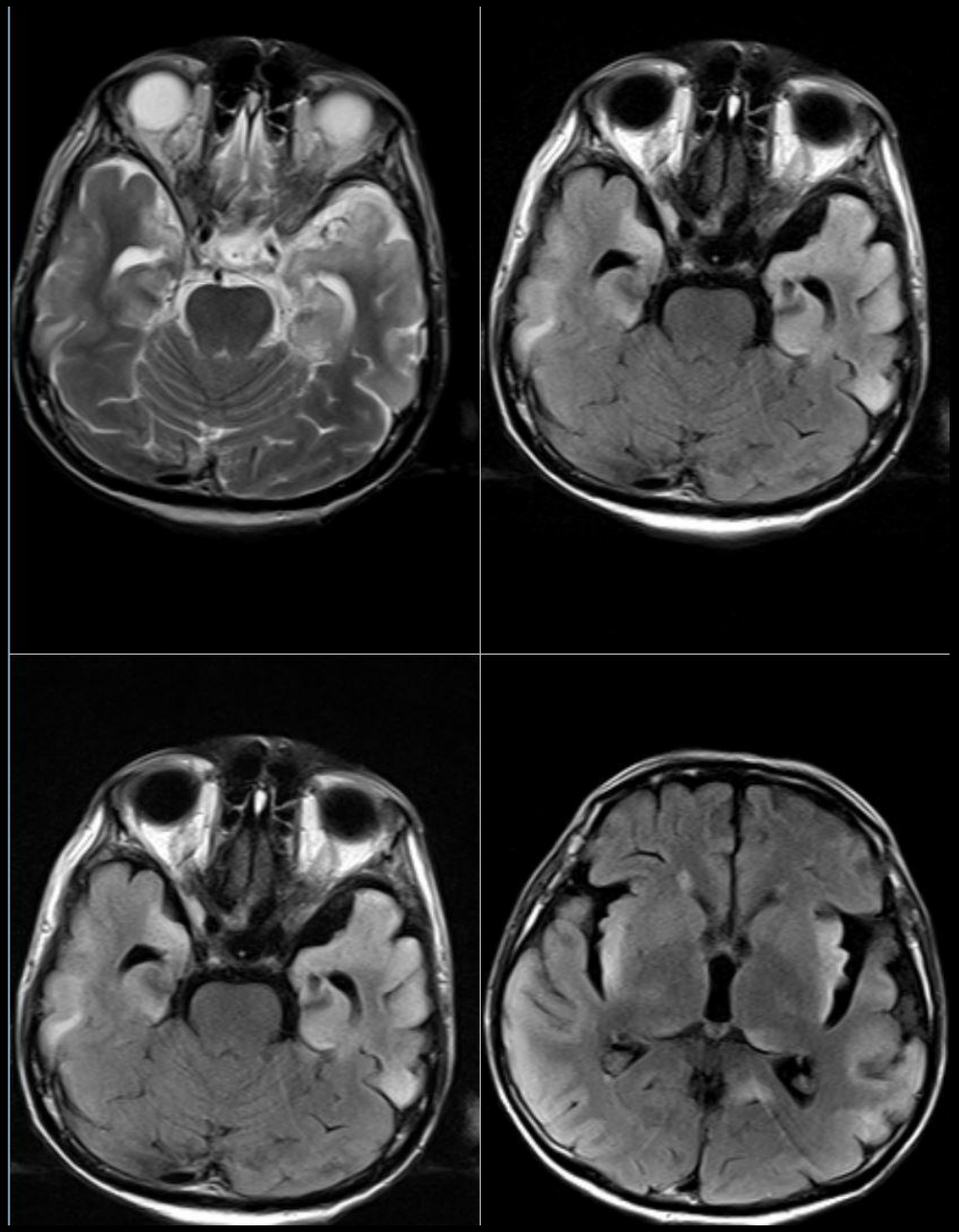


66 y, E, Mide Ca, Konfüzyon, Metastaz??

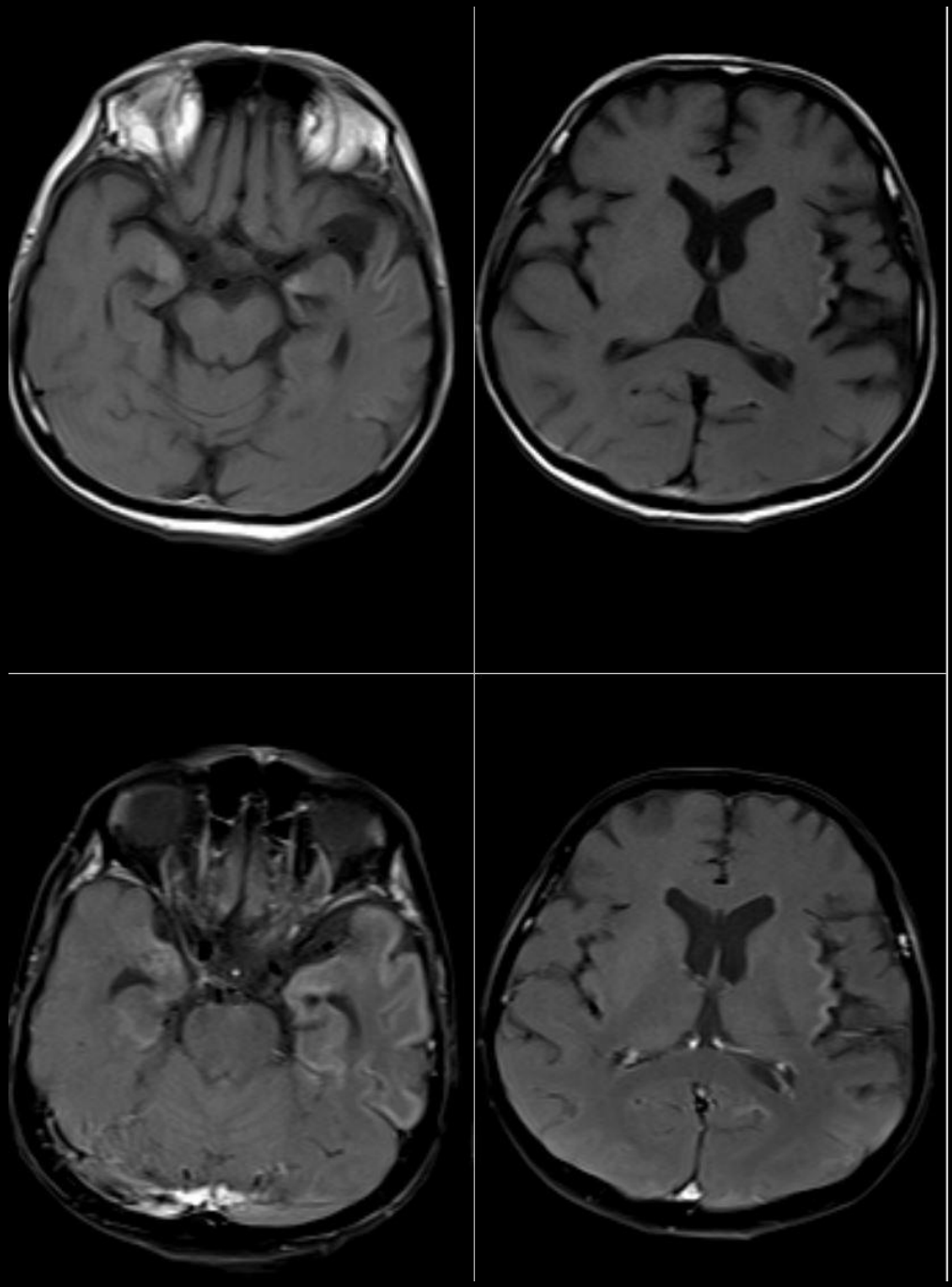




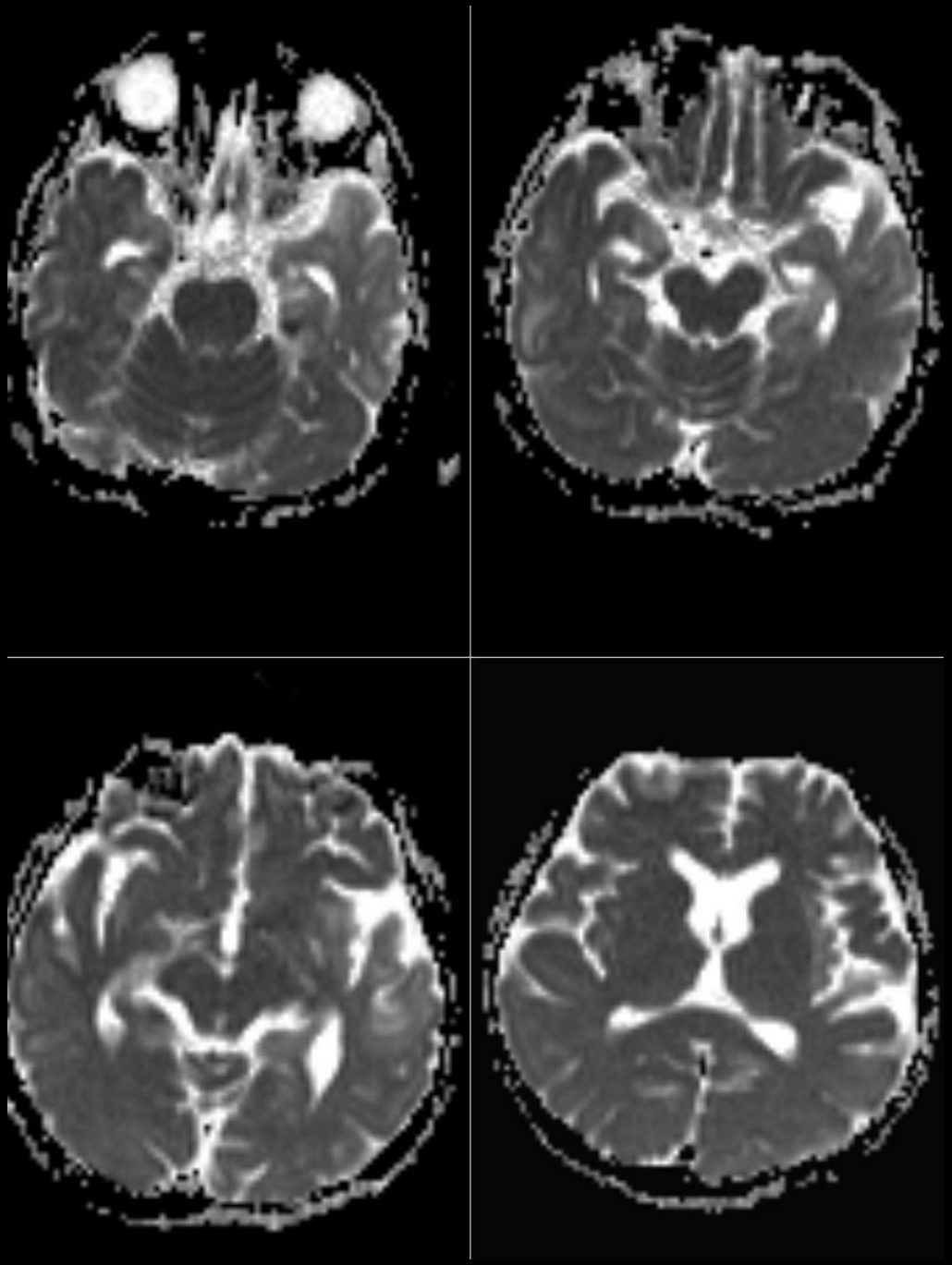
3 hafta
sonraki
izlem MRG

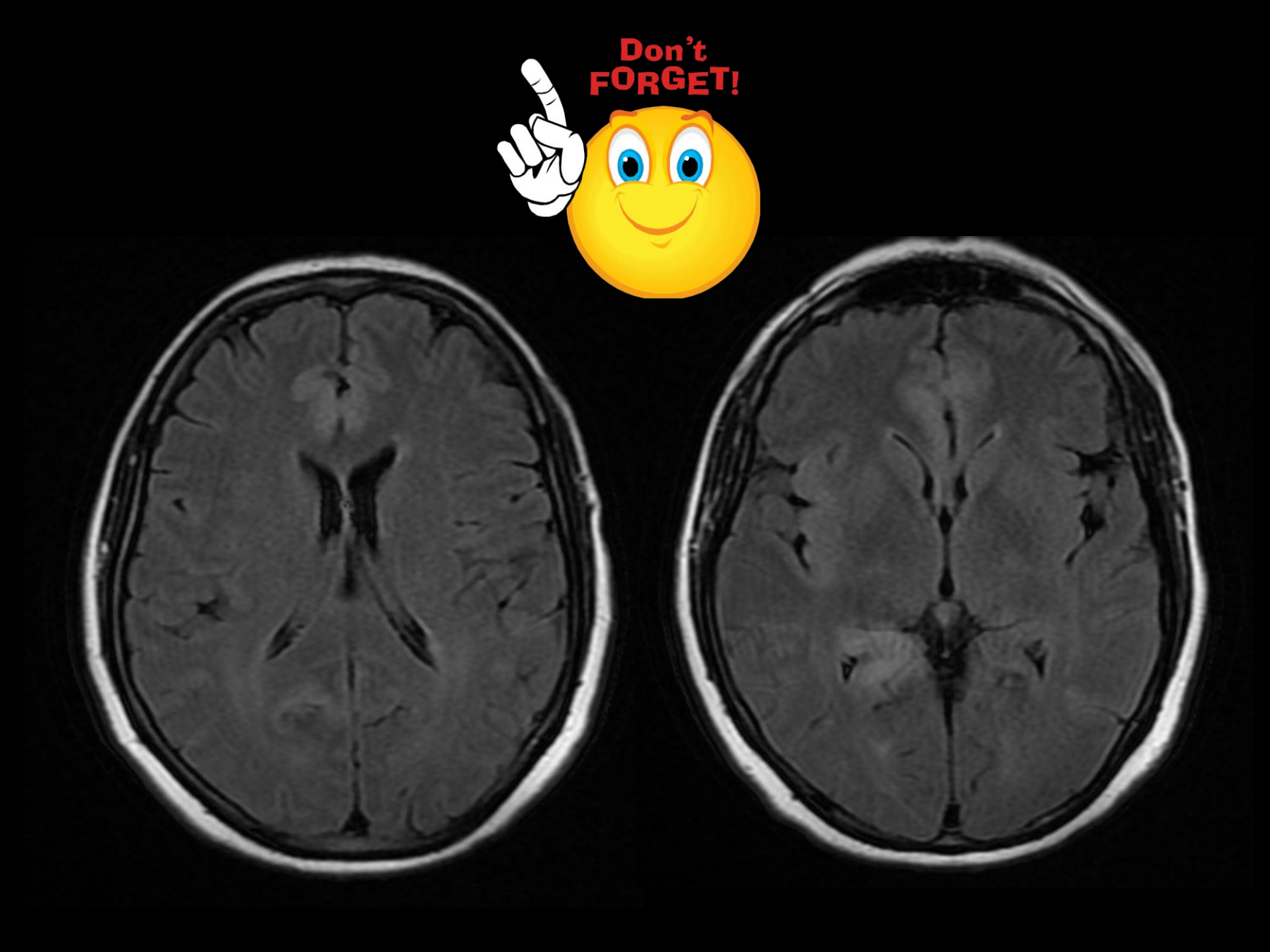


3 hafta
sonraki
izlem MRG



3 hafta
sonraki
izlem MRG




Don't
FORGET!

Subakut ensefalitler

- HIV ensefaliti
- PML (progresif multifokal lökoensefalopati)
- CMV ensefaliti
- CJD (Creutzfeldt-Jacob) ensefaliti
- SSPE (subakut sklerozan panensefalit)

HIV ensefaliti

- Direkt olarak HIV virüsünün beyin parankimini infiltre etmesi
- Demans kliniği
- Atrofi
- Periventriküler beyaz cevher tutulumu
  - Simetrik

PML

- Progresif multifokal lökoensefalopati

- JC virüs
- En sık AIDS'li hastalarda
- Myelin hasarı
- ASİMETRİK (!)
- Supratentorial, bilateral, konfluens gösteren, ağırlıklı olarak subkortikal

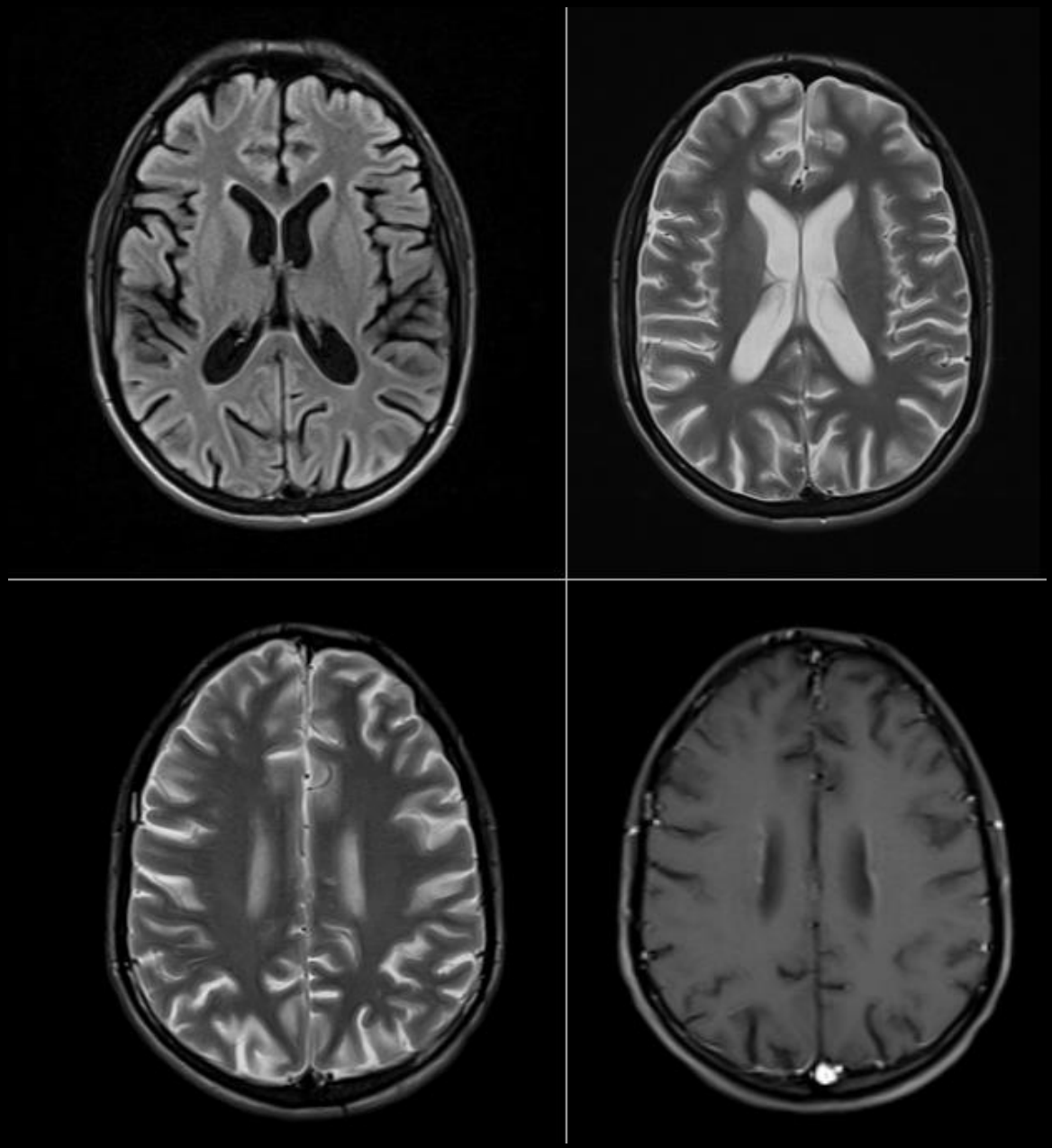
HIV ensefaliti

Periventriküler
Simetrik
Atrofi

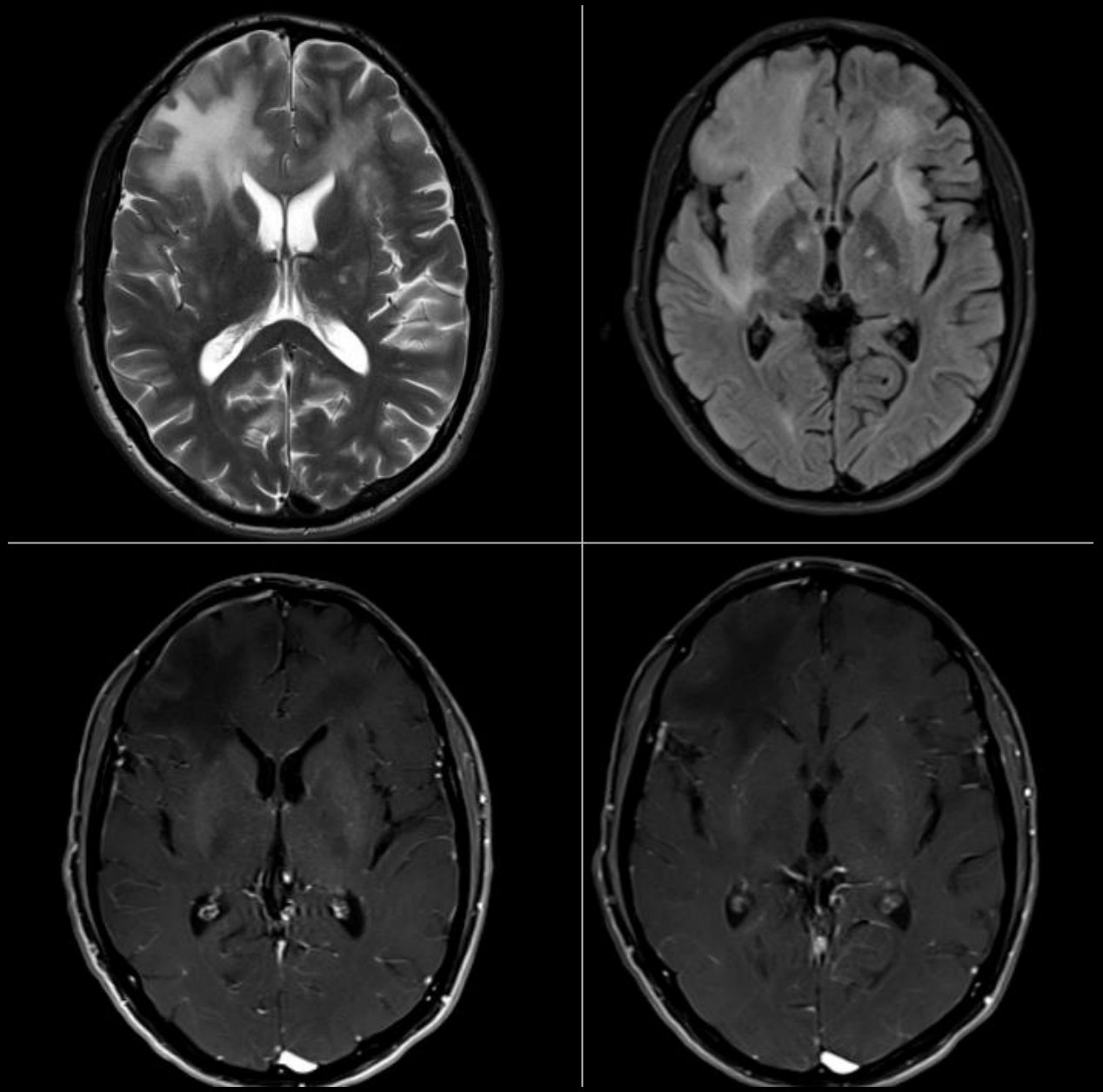
PML

Subkortikal
Asimetrik

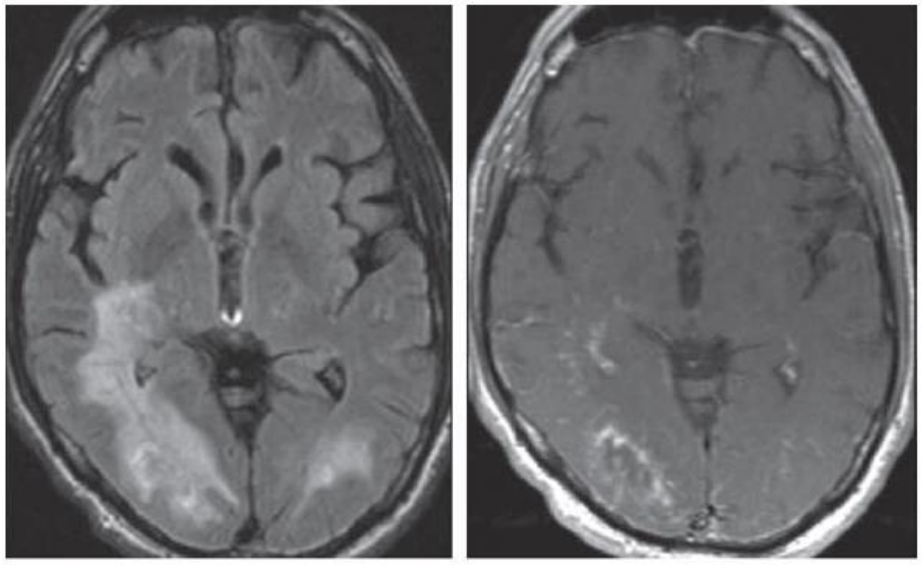
27 y, E, HIV (+)



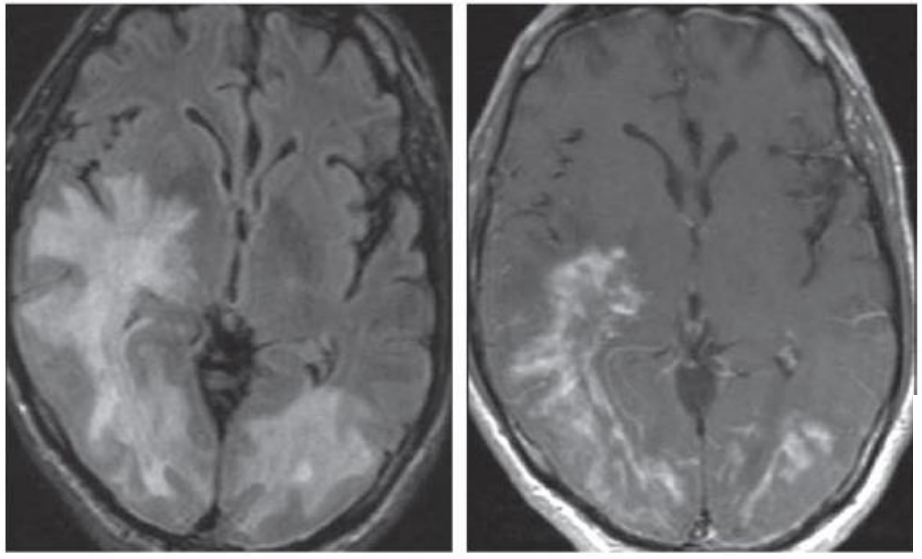
2 yıl sonraki beyin MRG, PML



IRIS



a. b.



From the Archives of the AFIP

Central Nervous System Infections Associated with Human Immunodeficiency Virus Infection: Radiologic-Pathologic Correlation[1]

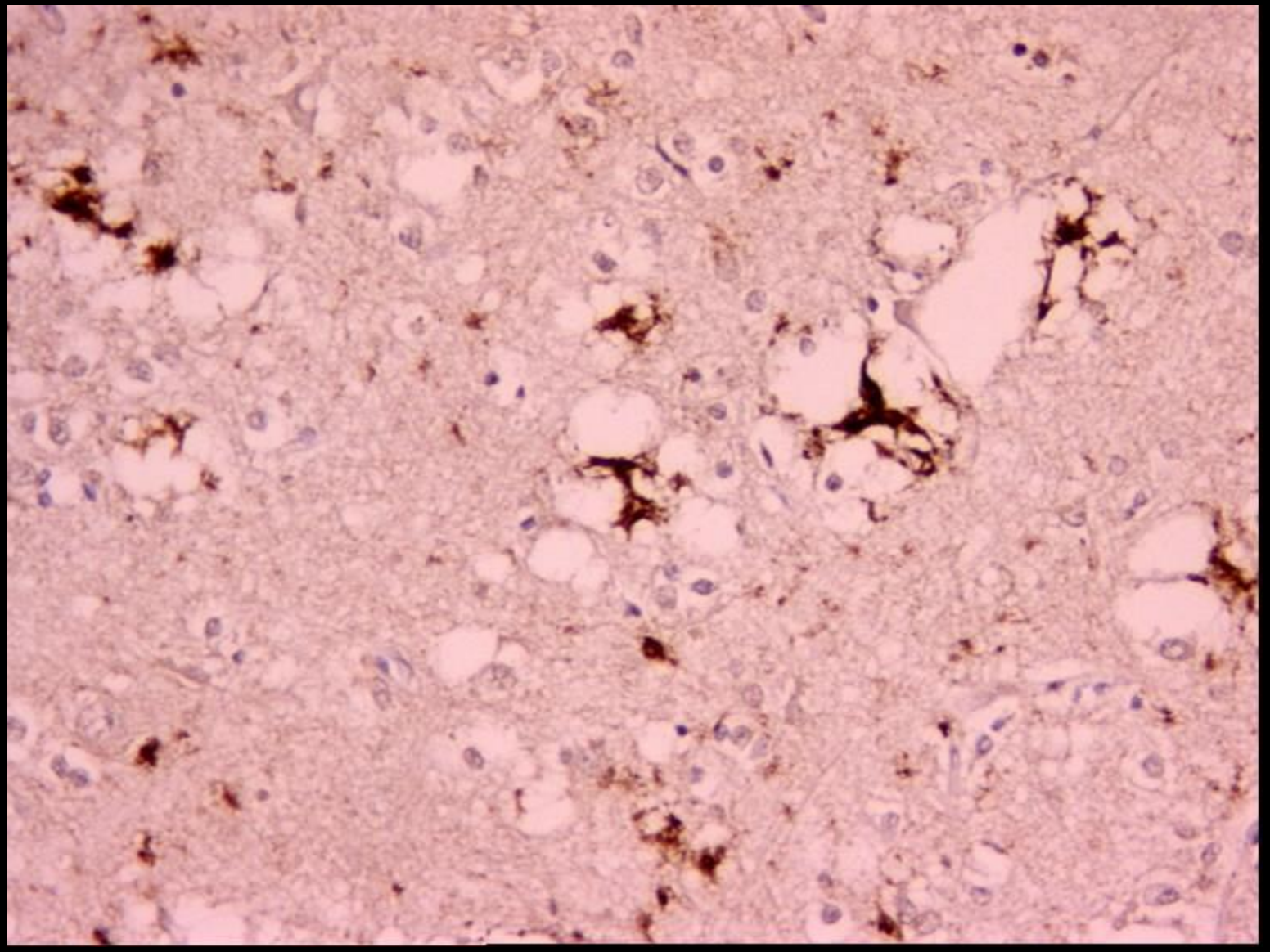
Alice B. Smith, Lt Col, USAF, MC • James G. Smirniotopoulos, MD
Elisabeth J. Rushing, COL, MC, USA

c. d.

Figure 21. IRIS in a patient with biopsy-proved PML. **(a)** Axial T2-weighted FLAIR image demonstrates T2 hyperintensity in the bilateral (right greater than left) periatrial white matter. **(b)** Axial postcontrast T1-weighted image reveals diffuse patchy enhancement in the region of the T2 hyperintensity. **(c)** Axial T2-weighted FLAIR image obtained 2 weeks later demonstrates progression of the T2 hyperintensity, with an increase in mass effect. **(d)** Axial postcontrast T1-weighted image reveals progression of the patchy enhancement in the 2-week interval. (Case courtesy of Max Wintermark, MD, University of California, San Francisco.)

Creutzfeldt-Jacob hastalığı

- Prion hastalığı
- Kalıtsal / enfeksiyöz tipi var
- Sığır spongiform ensefalopati (deli dana hastalığı) ile enfekte hayvanlardan bulaşan formu yeni varyant CJH



Prion protein antikoru ile immünhistokimyasal boyama yöntemi

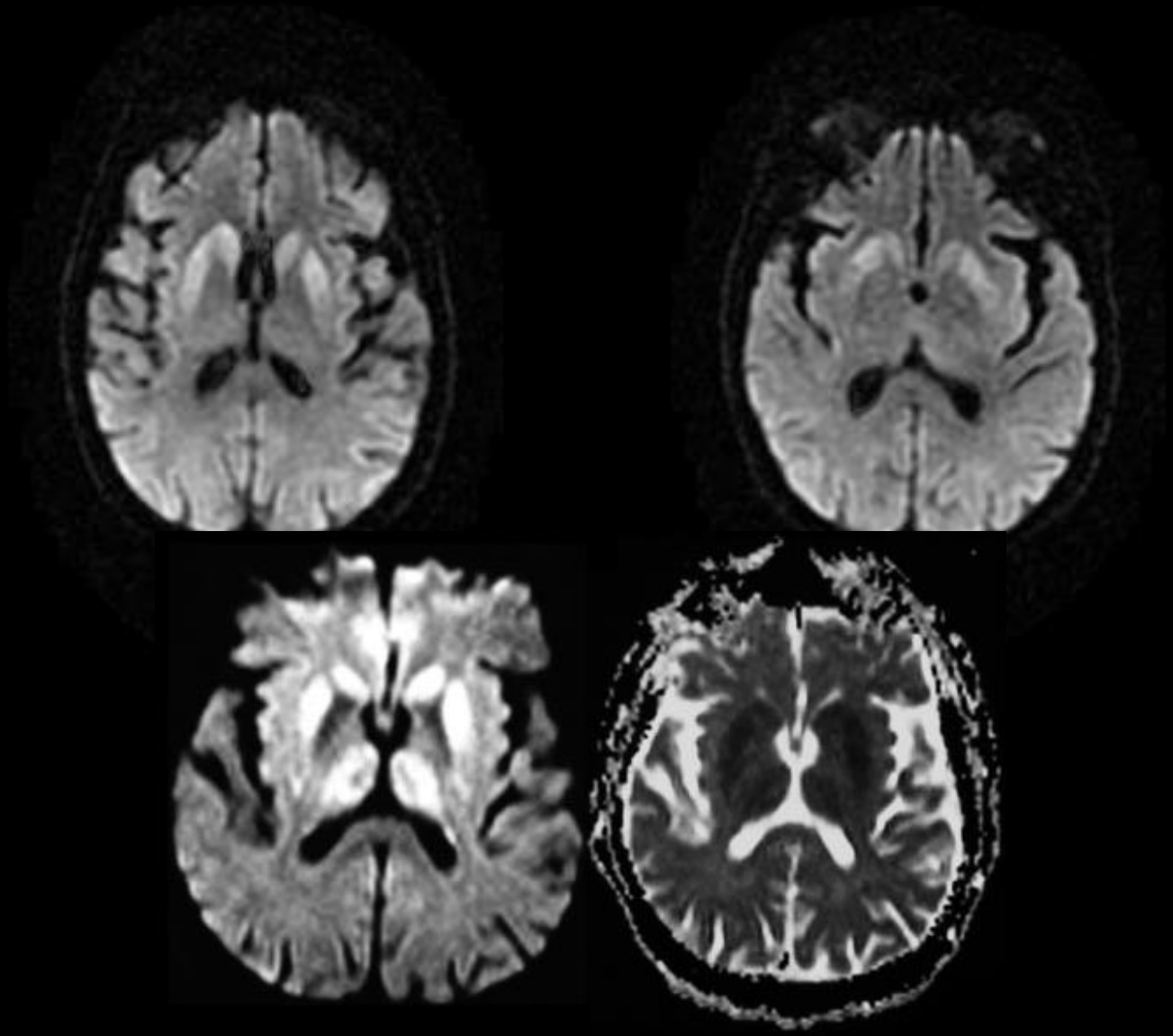
Creutzfeldt-Jacob hastalığı

- İnsidans milyonda 1-5
- Ortalama başlangıç yaşı 60, süre 8 ay
- Hastaların tamamında bellek bozukluğu veya kaybı
- Davranış bozukluğu
- Serebellar bulgular
- MORTAL

Creutzfeldt-Jacob hastalığı

- Prion hastalığı
- Hızlı ilerleyen atrofi
- MRG’ de T2 ağırlıklı görüntülerde simetrik bazal ganglion intensite artışı
- Bu alanlarda difüzyon kısıtlanması
- Kortikal perfüzyon azalması (FDG-PET, perfüzyon MRG)
- EEG bulguları karakteristik

Creutzfeldt-Jacob hastalığı

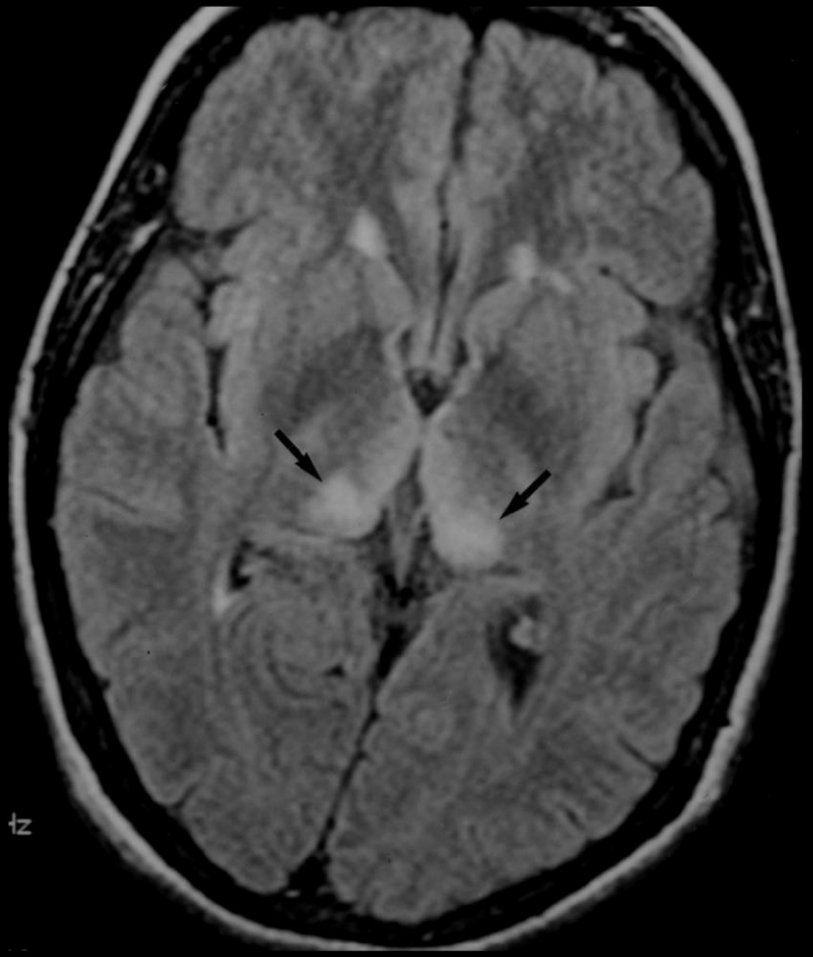


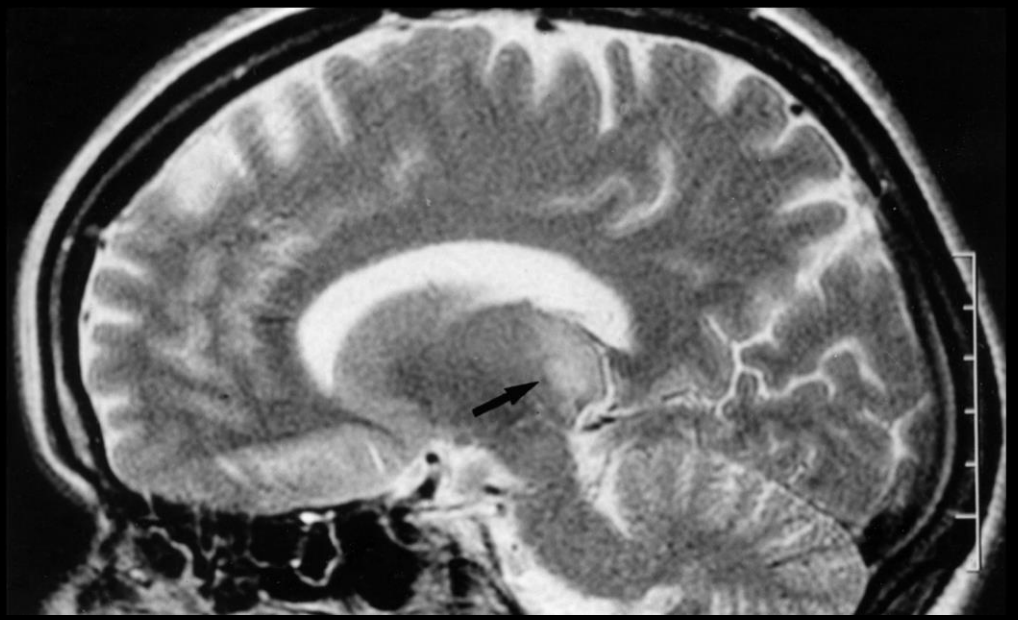
Yeni varyant Creutzfeldt-Jacob hastalığı

- Sığır spongiform ensefalopati (deli dana hastalığı) ile enfekte hayvanlardan bulaşır

- Bilateral talamik (pulvinar) simetrik intensite artışı

Yeni varyant Creutzfeldt-Jacob hastalığı



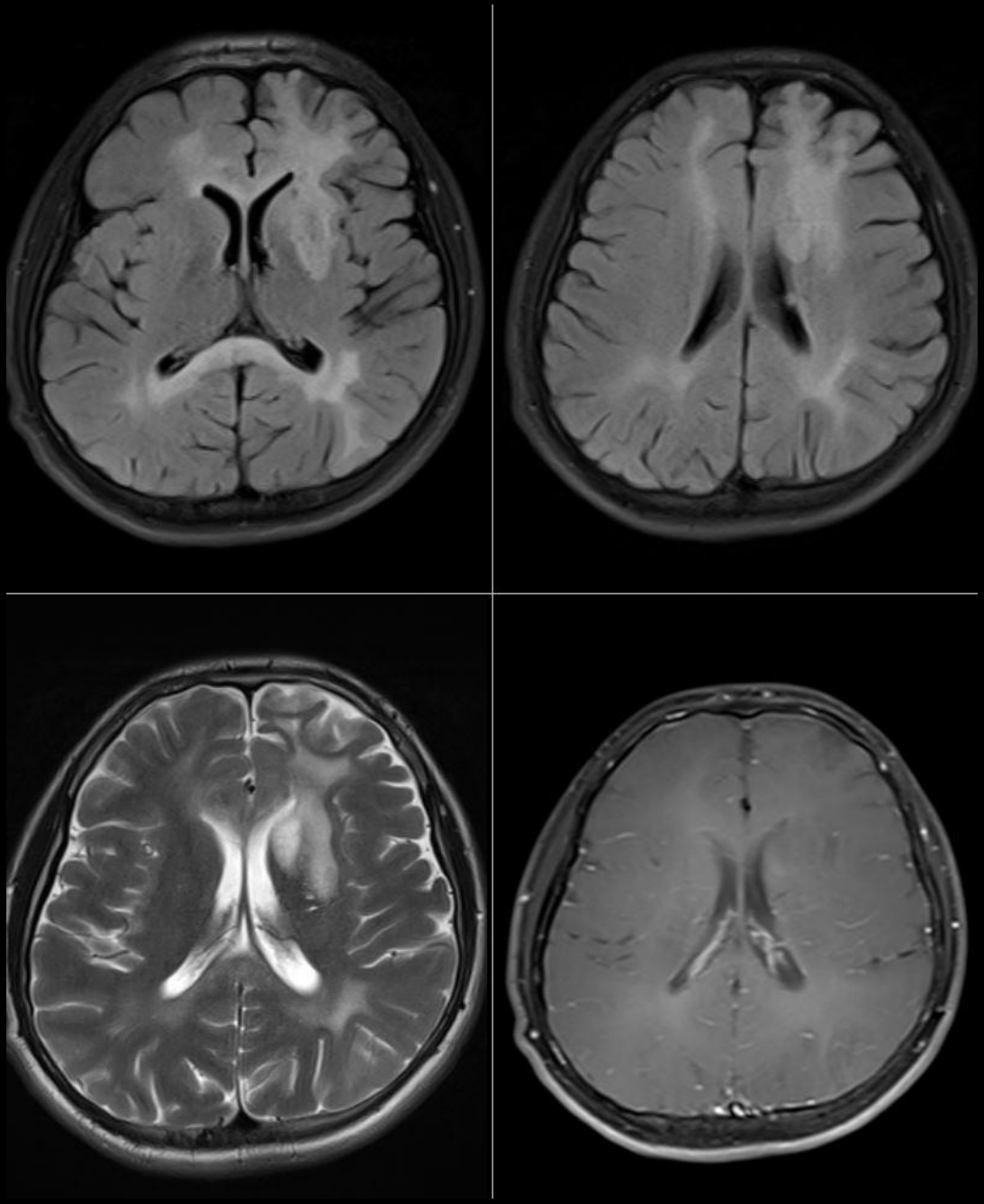


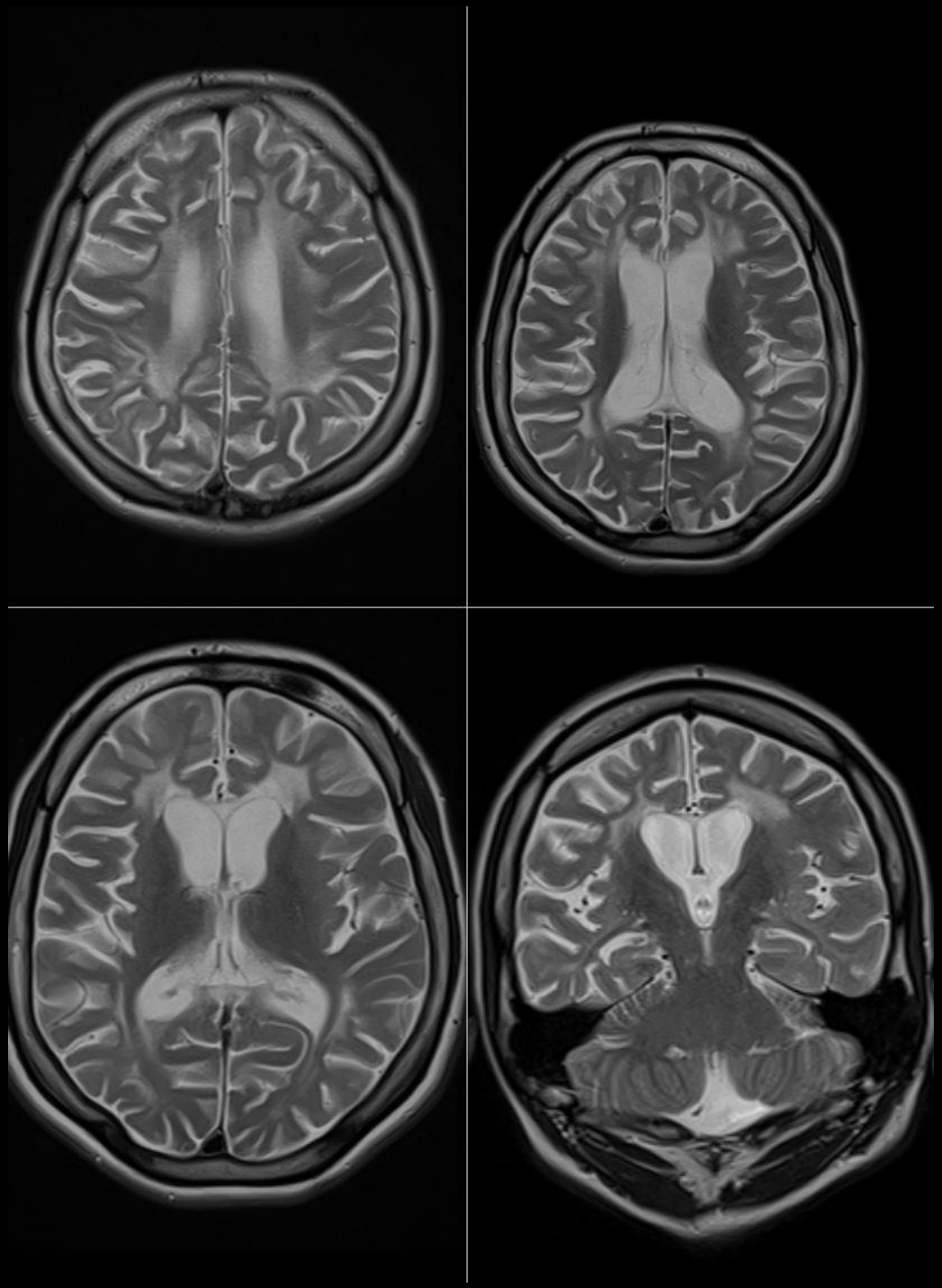
Pulvinar bulgusu

Molly S, et al. AJR 2000; 175:556

SSPE

- Subakut sklerozan panensefalit
- Kızamık virüsü reaktivasyonu
- Özellikle parietal ve temporal beyaz cevherde asimetrik lezyonlar
- Bazal ganglia
- İleri dönemde beyin sapı





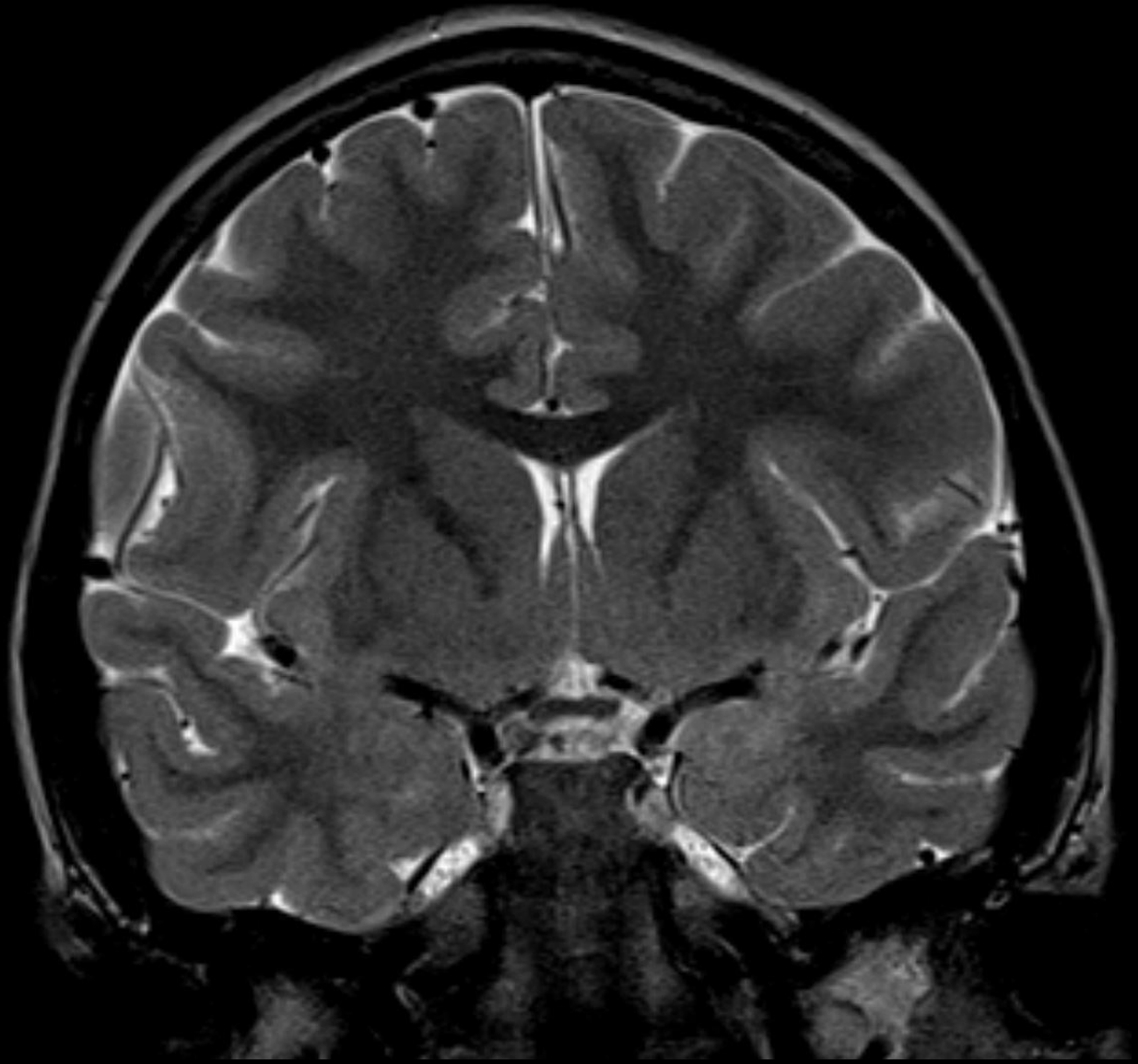
Rasmussen ensefaliti

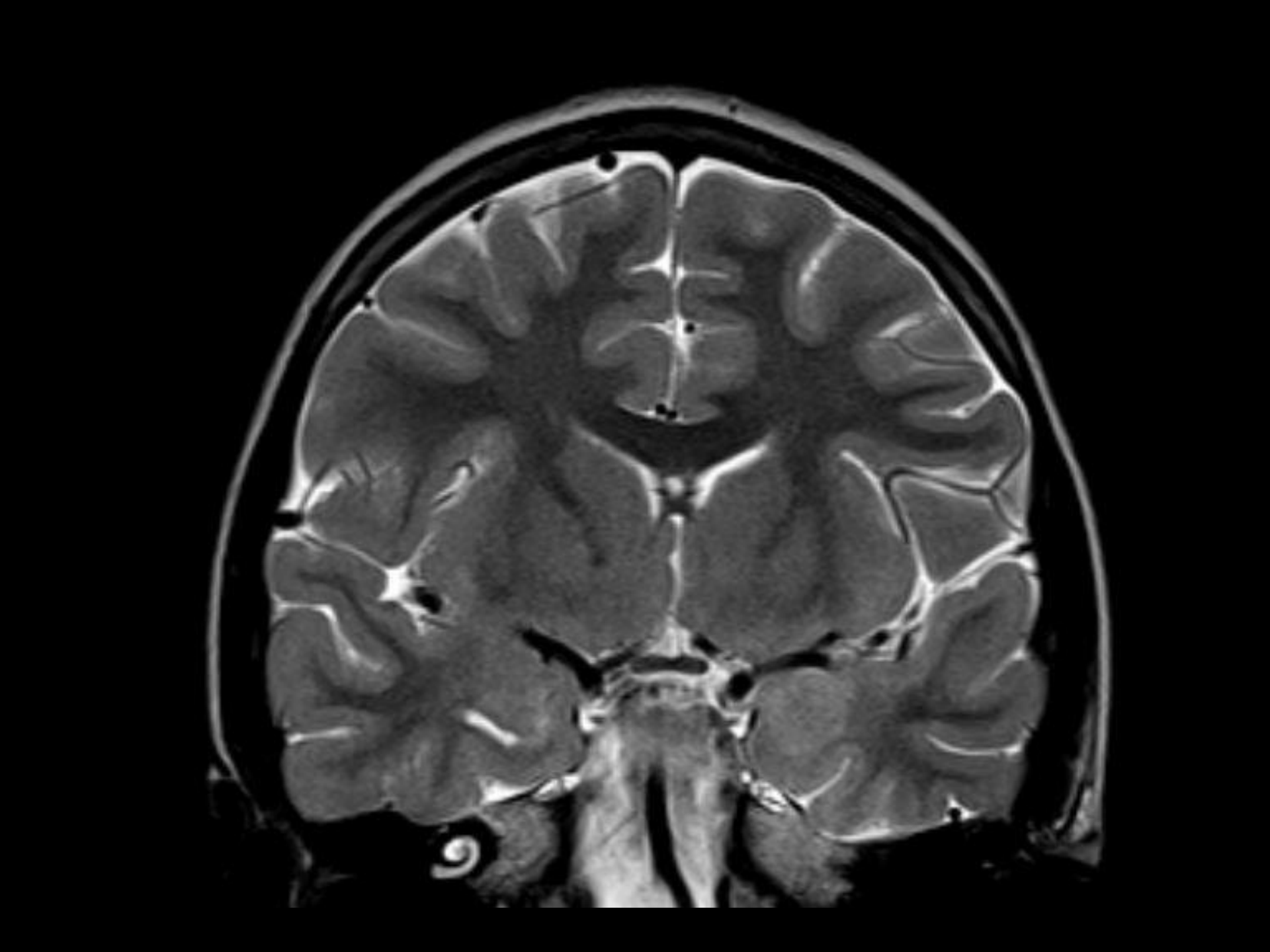
- Kronik fokal ensefalit
- Dirençli epilepsi
  - Epilepsia partialis continua
  - Generalize
- Özellikle çocukluk çağında (10 yaş altı)
- MRG normal olabilir
- Fokal intensite artışı, atrofi, beyaz cevher değişiklikleri/UNİLATERAL
- Bazal ganglion tutulumu

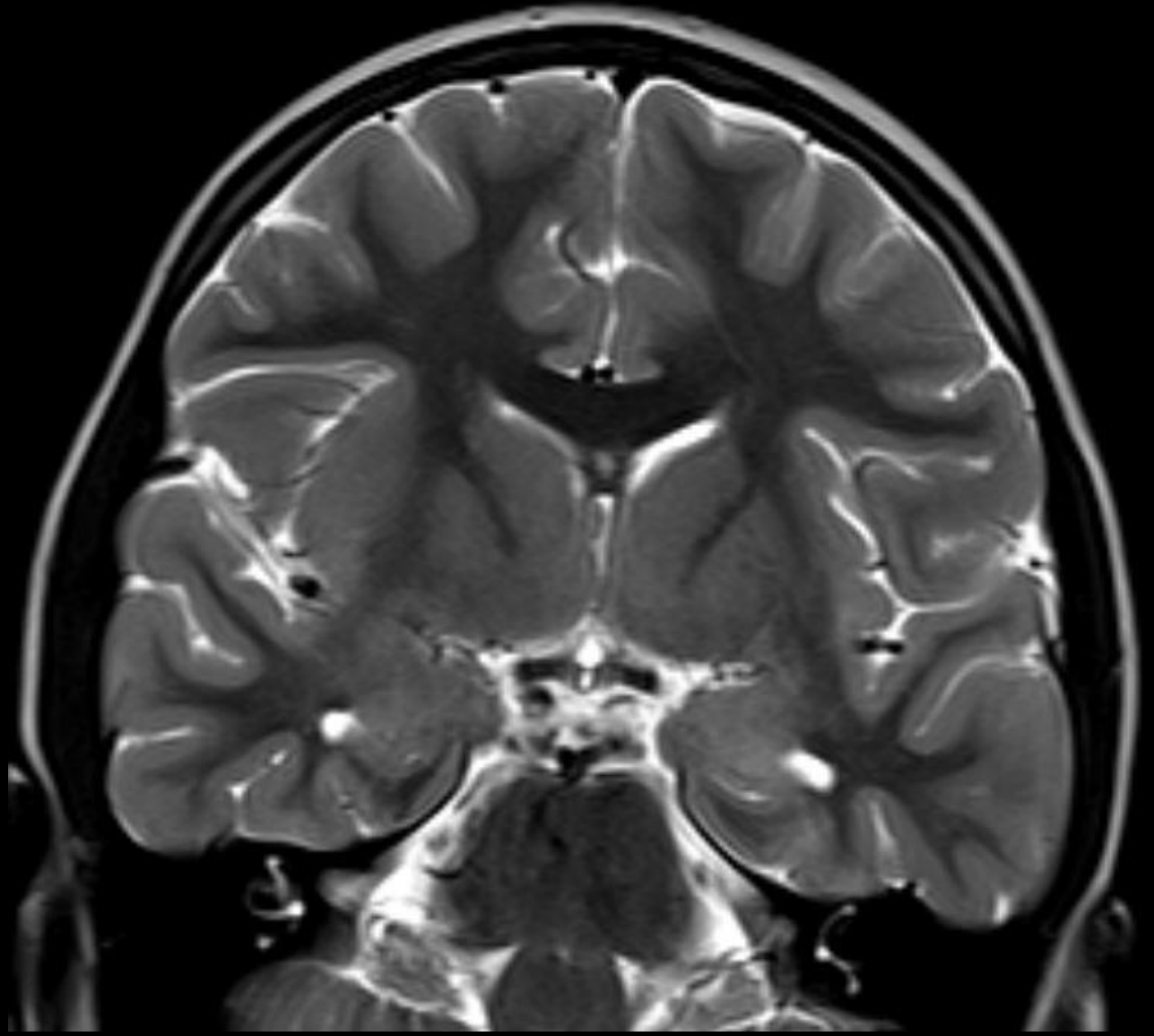
Rasmussen ensefaliti

- Neden tam olarak kesin değil
- Otoimmün
- Viral?? (SSPE benzeri? EBV? CMV?)
- Steroid / IVIG tedavisi
- Hemisferektomi ☹

5 y, K, nöbetler







Rasmussen's encephalitis: clinical features, pathobiology, and treatment advances

Sophia Varadkar, Christian G Bien, Carol A Kruse, Frances E Jensen, Jan Bauer, Carlos A Pardo, Angela

Rasmussen's encephalitis is a rare chronic neurological disorder, characterise
cerebral cortex, drug-resistant epilepsy, and progressive neurological and cogni
and immunological studies support the notion that Rasmussen's encephalitis is
to one or more antigenic epitopes, with potential additional contribution by au
association between histopathology and clinical presentation suggests that initia
T cells and microglia, suggesting a window for treatment if Rasmussen's e
Advances in neuroimaging suggest that progression of the inflammatory proc
biomarker in Rasmussen's encephalitis. For many patients, families, and docto
from medical management to surgery is a real therapeutic dilemma. Cerebral
cure for seizures, but there are inevitable functional compromises. Decisions of
undertaken are challenging in the absence of a dense neurological deficit, a
Further, the optimum time for surgery, to give the best language and cognitive
Immunomodulatory treatments seem to slow rather than halt disease progre
without changing the eventual outcome.

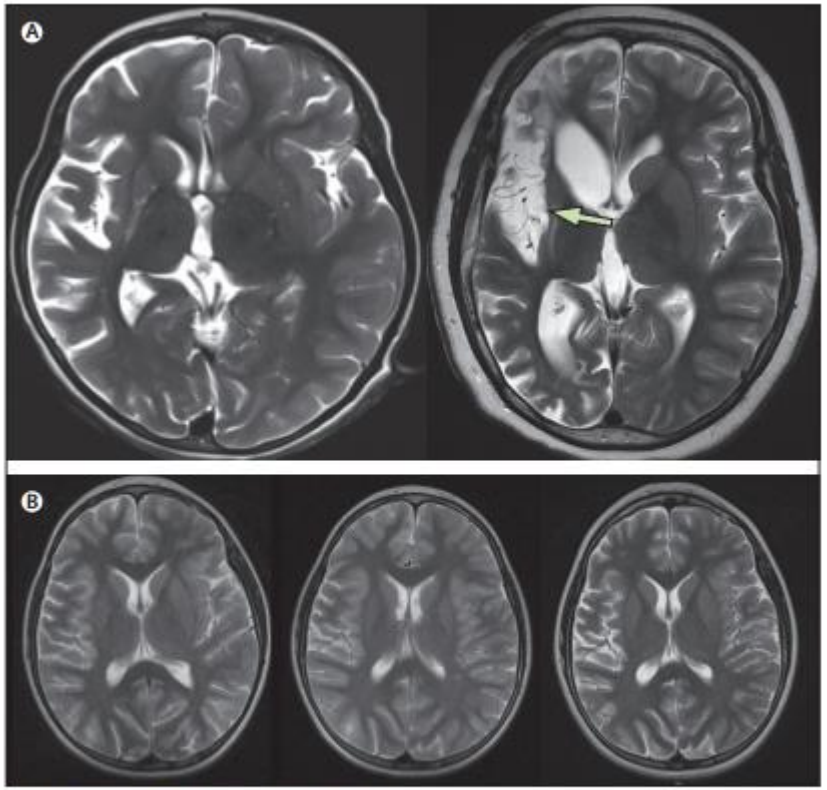


Figure 2: **Neuroimaging in Rasmussen's encephalitis**
MRI brain scans of children with Rasmussen's encephalitis, showing contrasting cases of radiological progression. (A) Progressive right hemisphere atrophy, high signal and basal ganglia loss over 1 year (from left to right) in a child with Rasmussen's encephalitis. The disease was mostly centred near the right Sylvian fissure (arrow). (B) Slowly progressive disease with more subtle right hemisphere atrophy in a child on immunosuppressant treatment at 6 months (left), 18 months (centre), and 30 months (right) of disease course.

Sistiserkozis

- Taenia solium
- Santral sinir sisteminin en sık paraziter enfeksiyonu
- Dört evre
  - Veziküler
  - Kolloidal ve veziküler
  - Granüler nodüler
  - Nodüler kalsifik

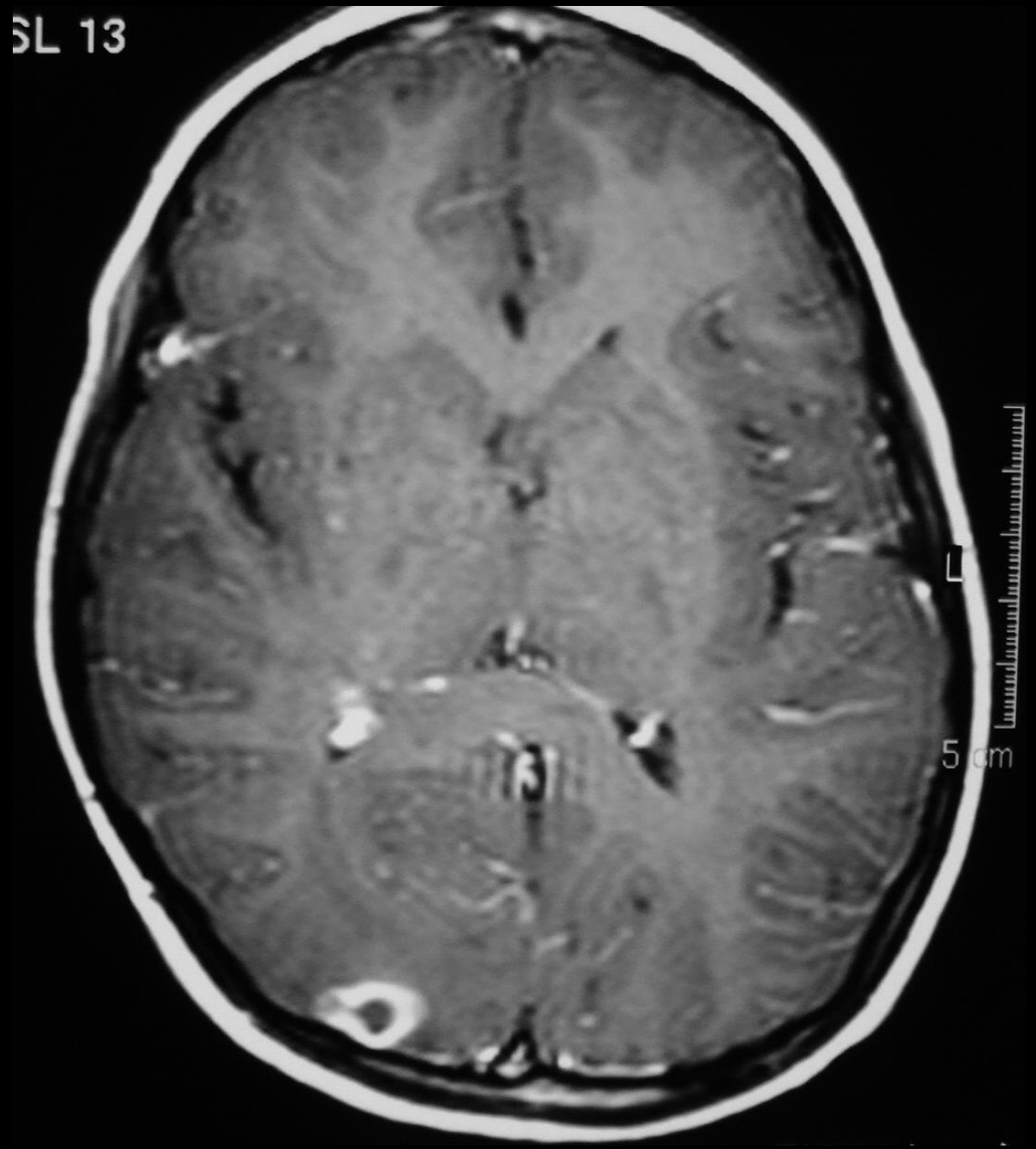
Sistiserkozis

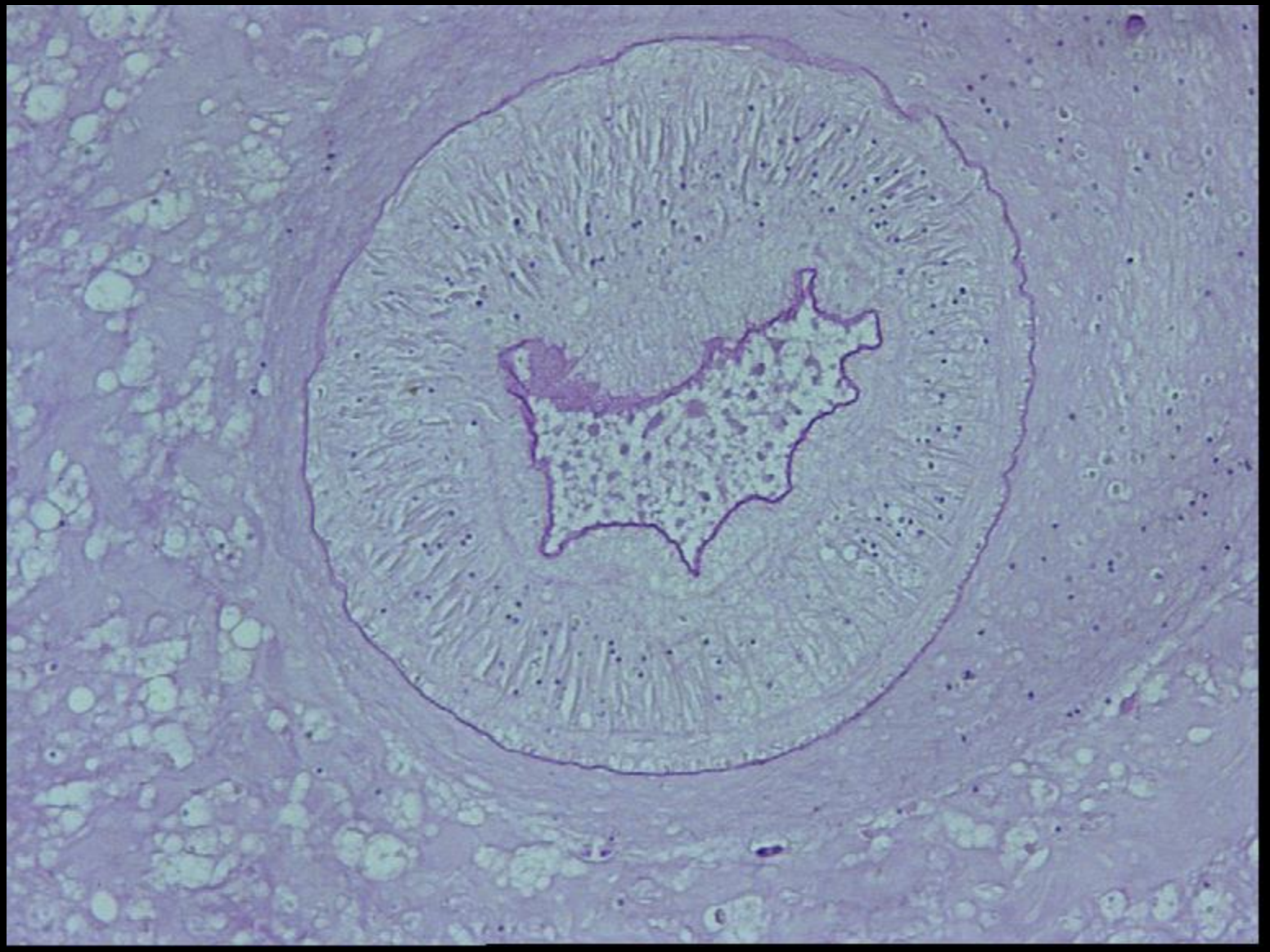
- Parankim
- Subaraknoid mesafe
- Ventrikül içi

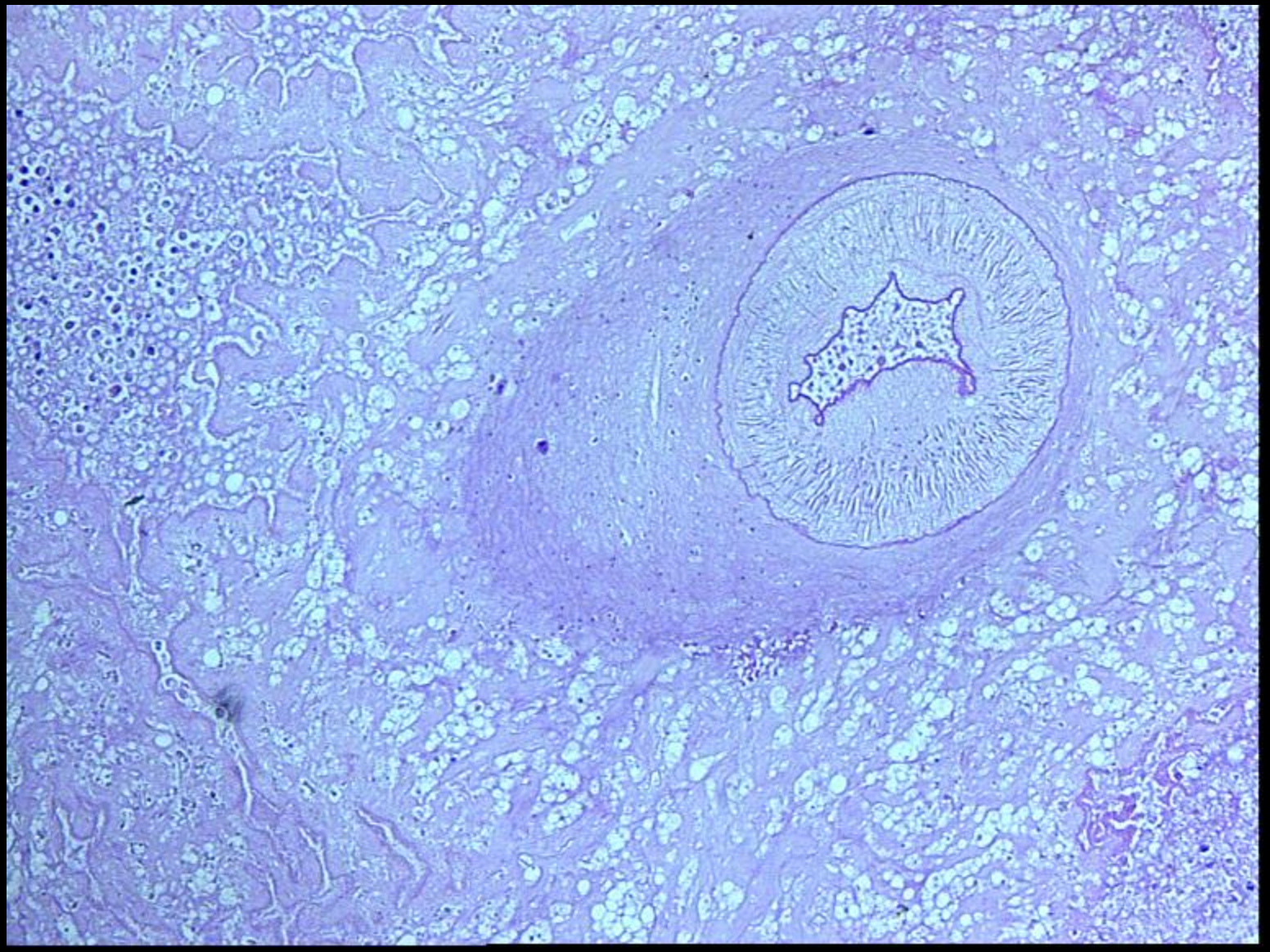
- ADC de kısıtlılık yapmaz

- 8 yaşında kız çocuk
- Altı ay içinde dört kez bayılma ve jeneralize tonik-klonik konvülzyon
- Dış merkezde çekilen CT’ de kitle tespit edilmiş.
- MR ‘ da sağ oksipital, kortikal yerleşimli , 1 cm çapında, periferik kontrast tutan, etrafı ödemli kitle lezyonu
- Tümör ? / Apse??


SL 12
L
5 cm
FH 53 head


SL 13
5 cm





Sistiserkozis

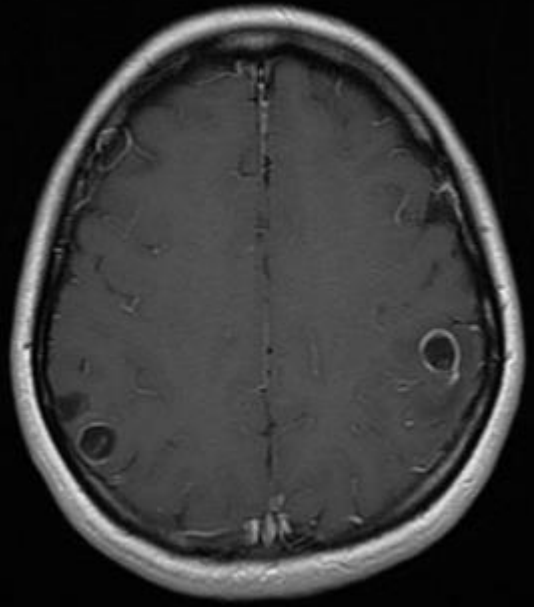
- Beyin parankiminde radyolojik olarak kistin dört evresi izlenebilir:

- İzlenebilen larval kist “**veziküler kist**” olarak bilinir. İmmün cevap tam gelişmediği için minimal kontrast tutulumu vardır. Kist içinde ekzantrik yerleşimli skoleks genellikle tanınır.

- Kistin dejenerasyonu ile kist içindeki sıvı parankime kaçış gösterir ve güçlü immün yanıt oluşturur. Bu durum, kontrast tutan, skoleks izlenmeyen “**kolloidal kist**”olarak tanınır.

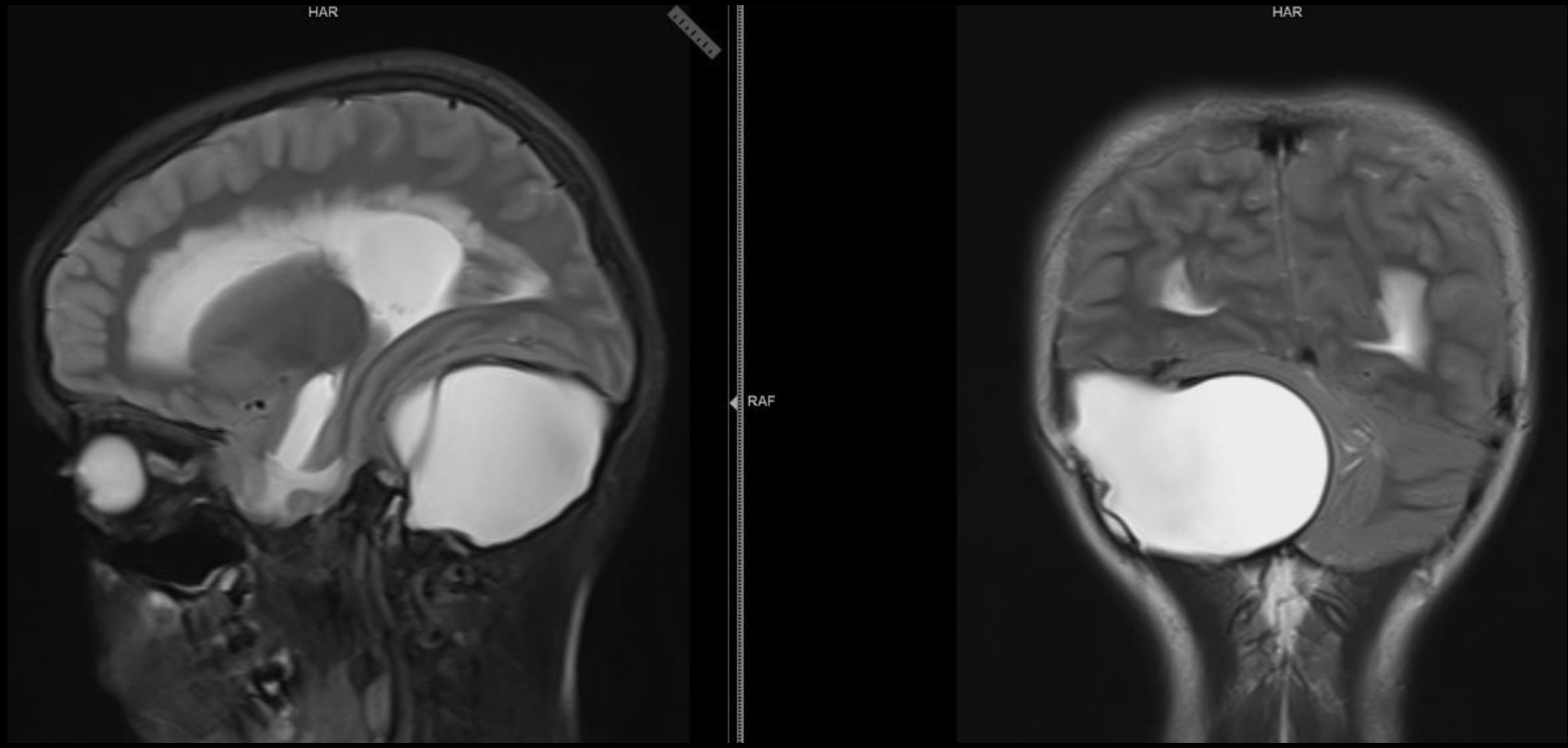
- Daha sonra kist nodül formunu kazanır ve kontrast tutmaya devam eder “**nodüler/granüler kist**”.

- En sonunda dejenere kist kalsifiye granüloma dönüşür. Bu haliyle kontrast tutmayan, noktasal kalsifikasyonlara sahiptir **“kalsifiye granülom”.**

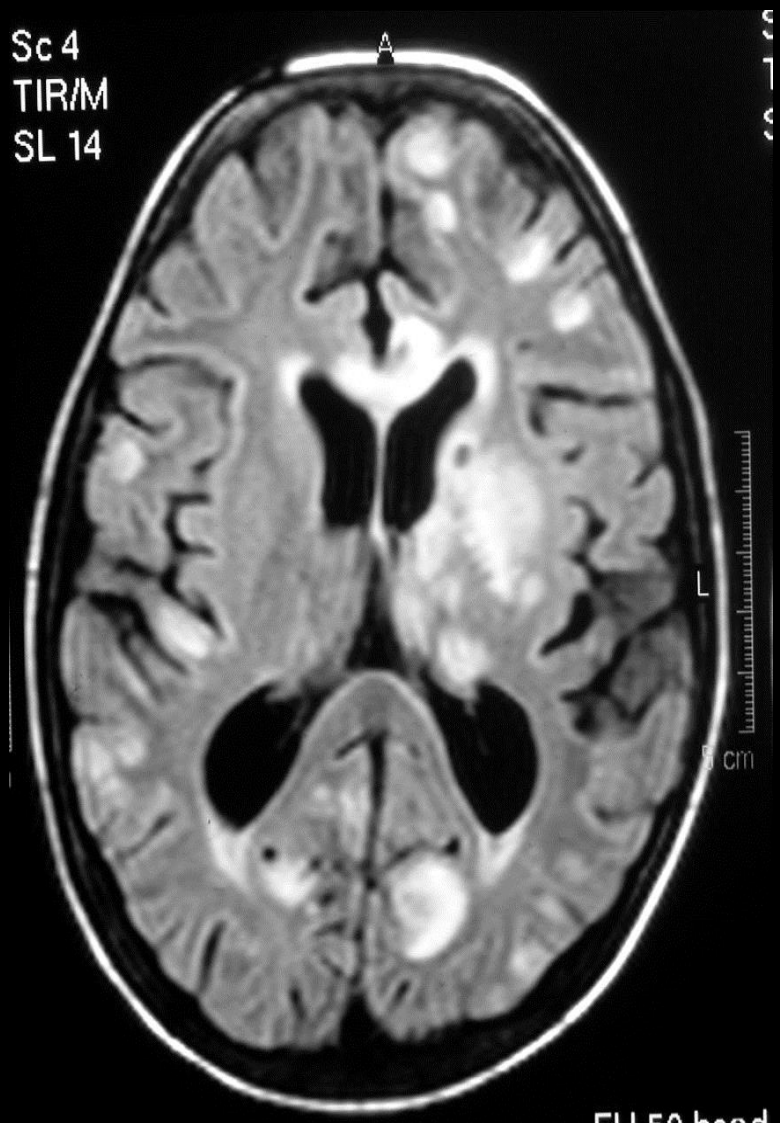


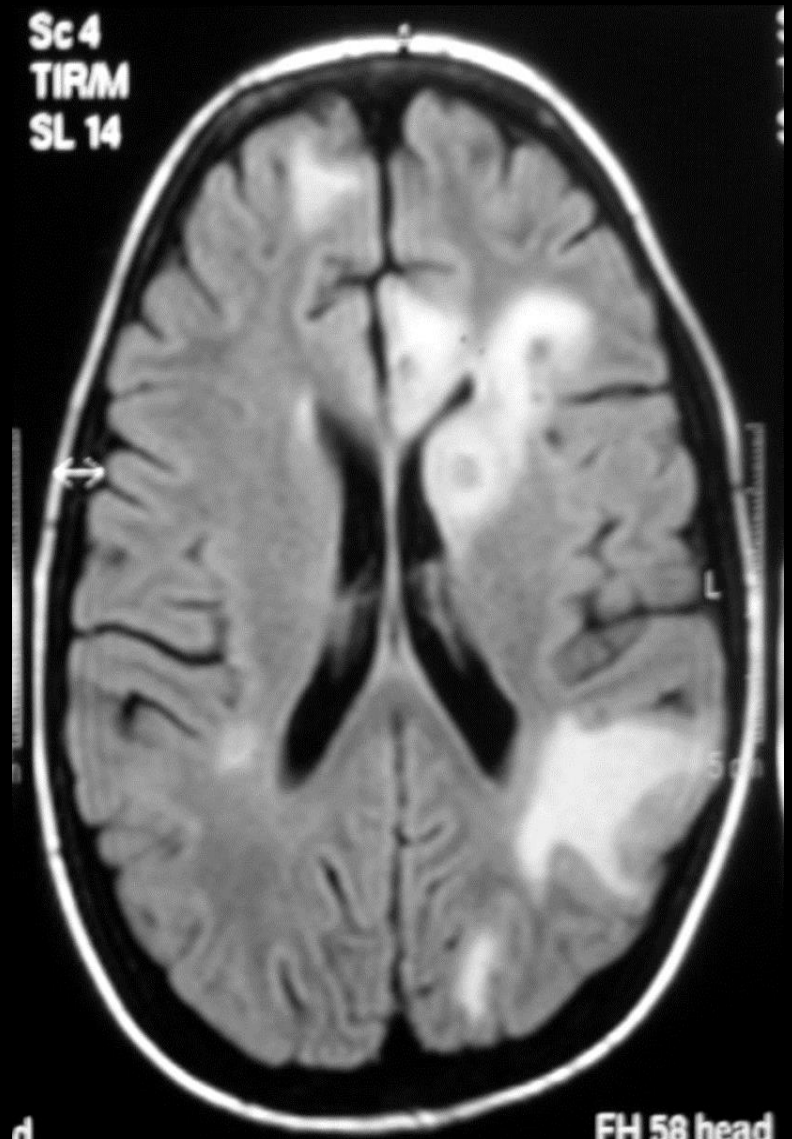
Hidatik kist

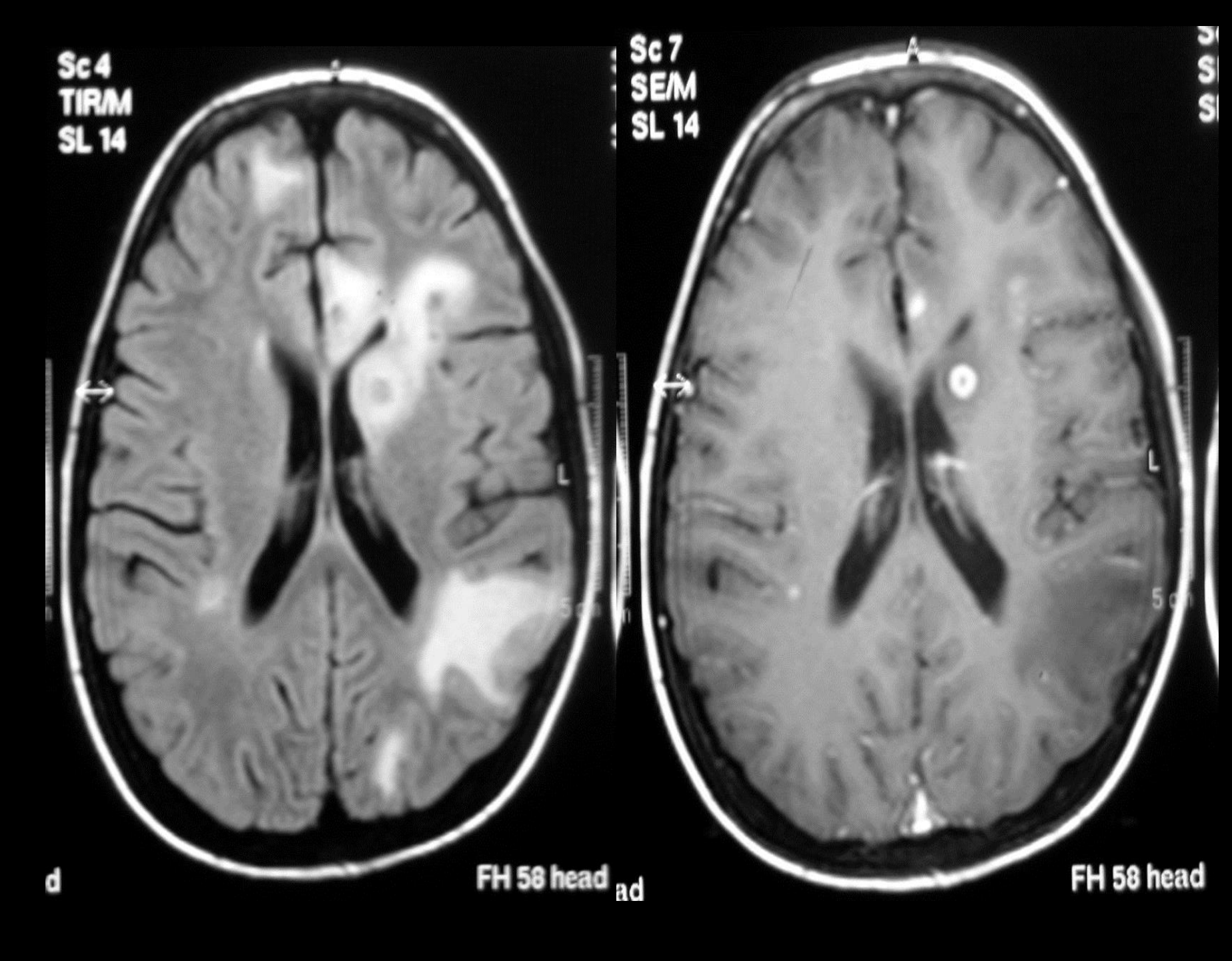
- Nadiren SSS enfeksiyonu yapar (% 3)
- Çoğunlukla çocuk hasta
- Supratentorial daha sık
- Tek kist

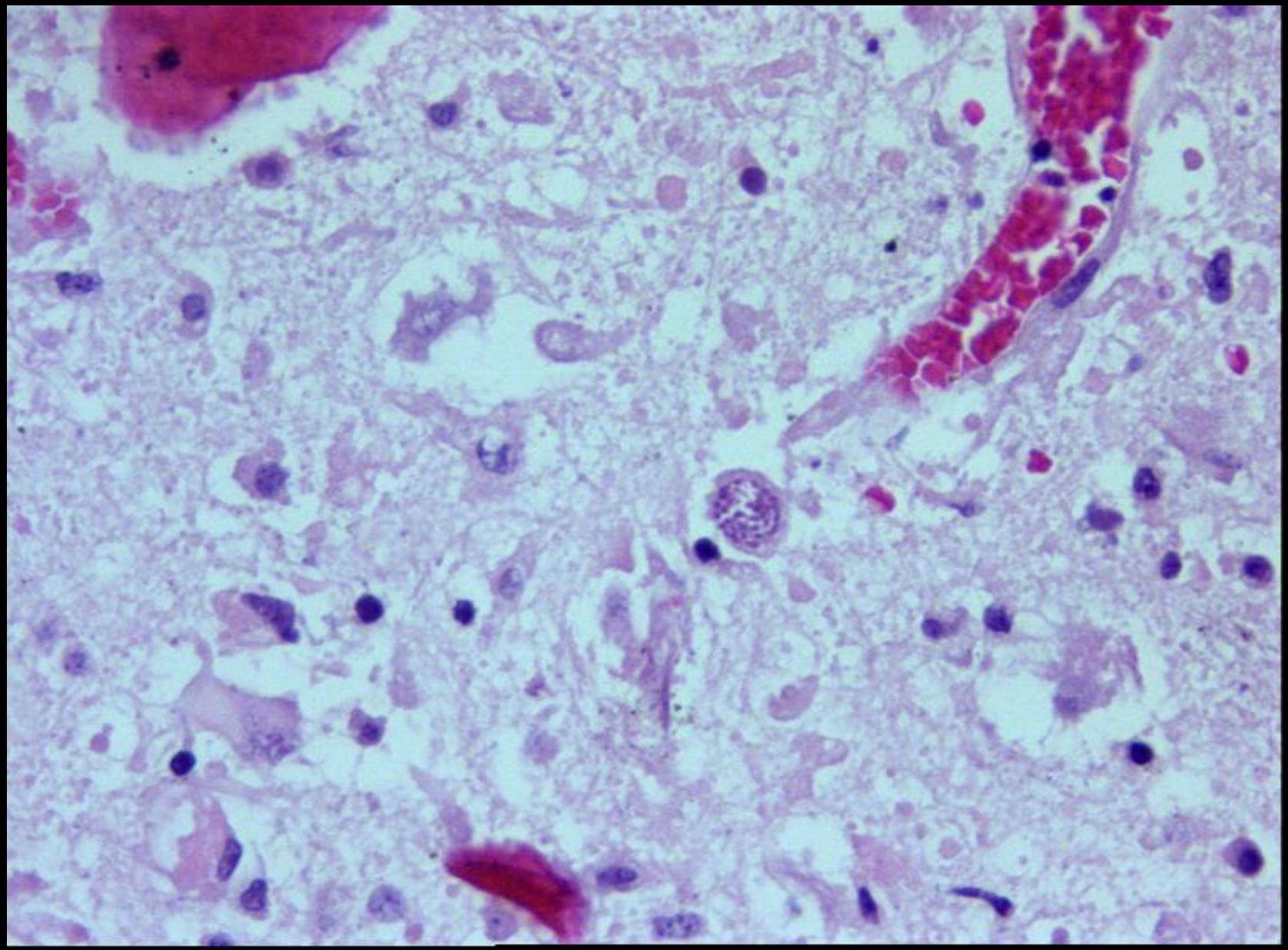

HAR
RAF
HAR

- 12 yaşında erkek çocuk
- Talasemi major tanısıyla 1,5 yaşından beri takipte olan hastaya 2007 tarihinde kök hücre nakli yapılmış.
- Nakil sonrası ara ara ve sırasıyla gelişen hipertansiyon, ateş, depresif bulgular, bilinç bulanıklığı ve jeneralize tonik konvülzyon şikayetleri mevcut.
- En son MRG' de izlenen lezyonlarla sonrasında beyin biyopsisi uygulandı.


Sc 4
TIR/M
SL 14
A
L
5 cm
d
FH 50 head


Sc 4
TIR/M
SL 14
L
d
FH 58 head


Sc 4
TIR/M
SL 14
L
FH 58 head
Sc 7
SE/M
SL 14
A
L
FH 58 head



Tanı

Toksoplazma Ensefaliti

Organ transplantasyonu sonrasında, neoplastik ve otoimmün hastalıklarda immünsüpresyonun yaygın kullanımı sonucu **enfeksiyöz ya da neoplastik olaylar** giderek artan şekillerde karşımıza çıkmaktadır.

İmmünyetmezliği olanlarda en sık izlenen fırsatçı protozoal enfestasyon Toksoplazmadır **(Toxoplasma gondii**).

- Radyolojik olarak etrafı ödemli, kontrast tutan, santral kısmı nekrotik kitle şeklindedir.

- Radyolojik özellikleri, primer santral sinir sistemi lenfoması ve tüberküloma ile benzerdir.

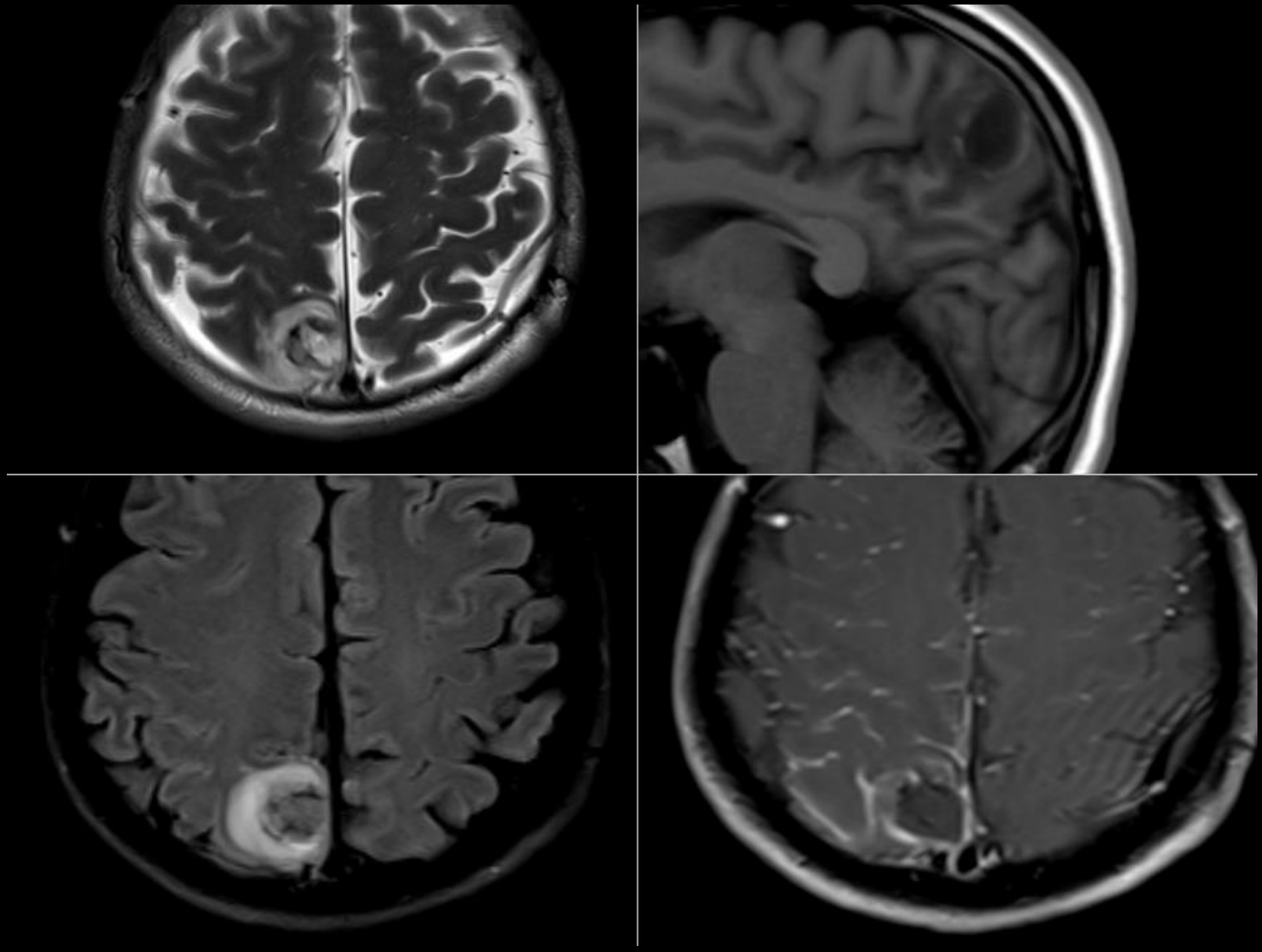
Mantar enfeksiyonları

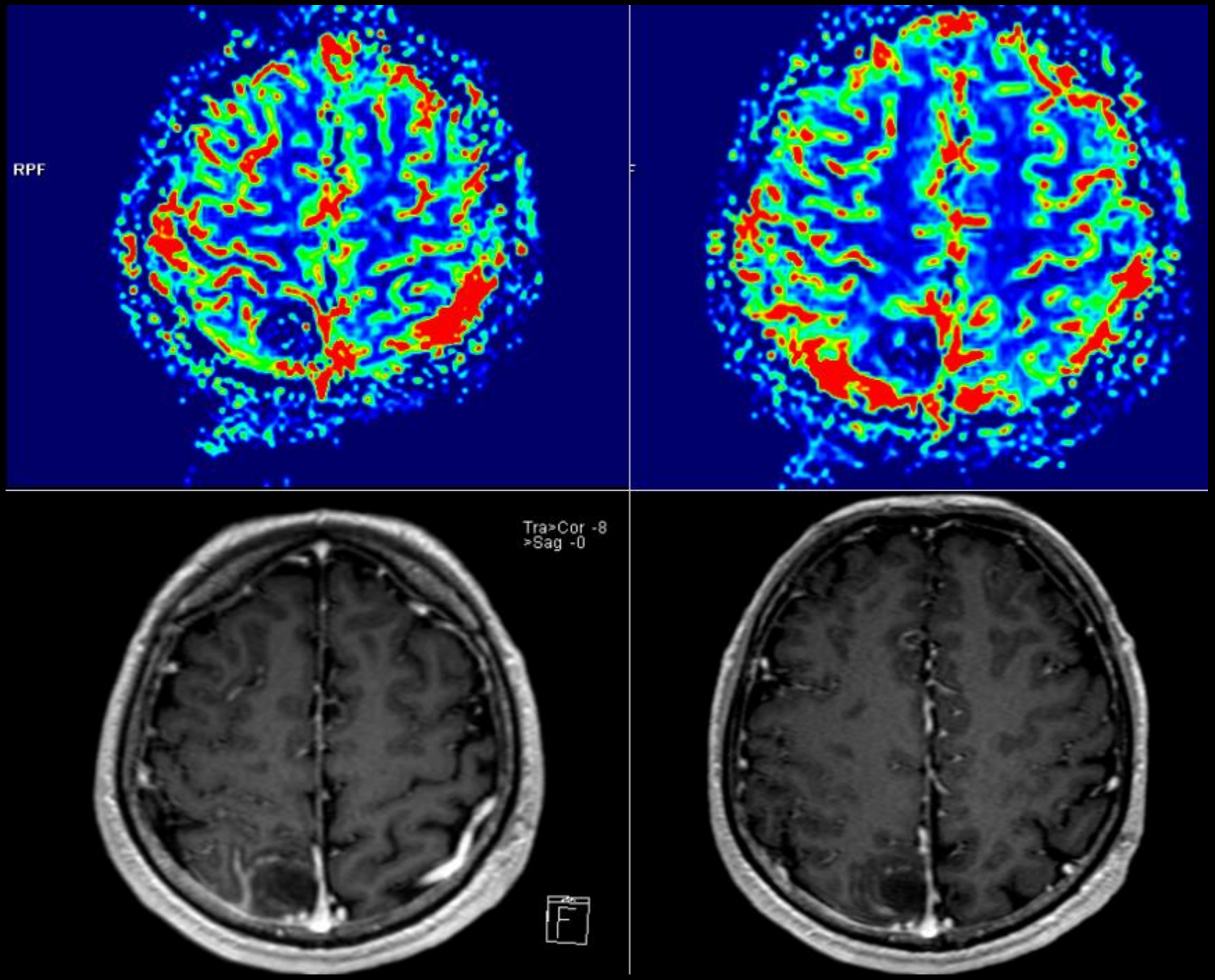
- İmmün sistem zayıflığı

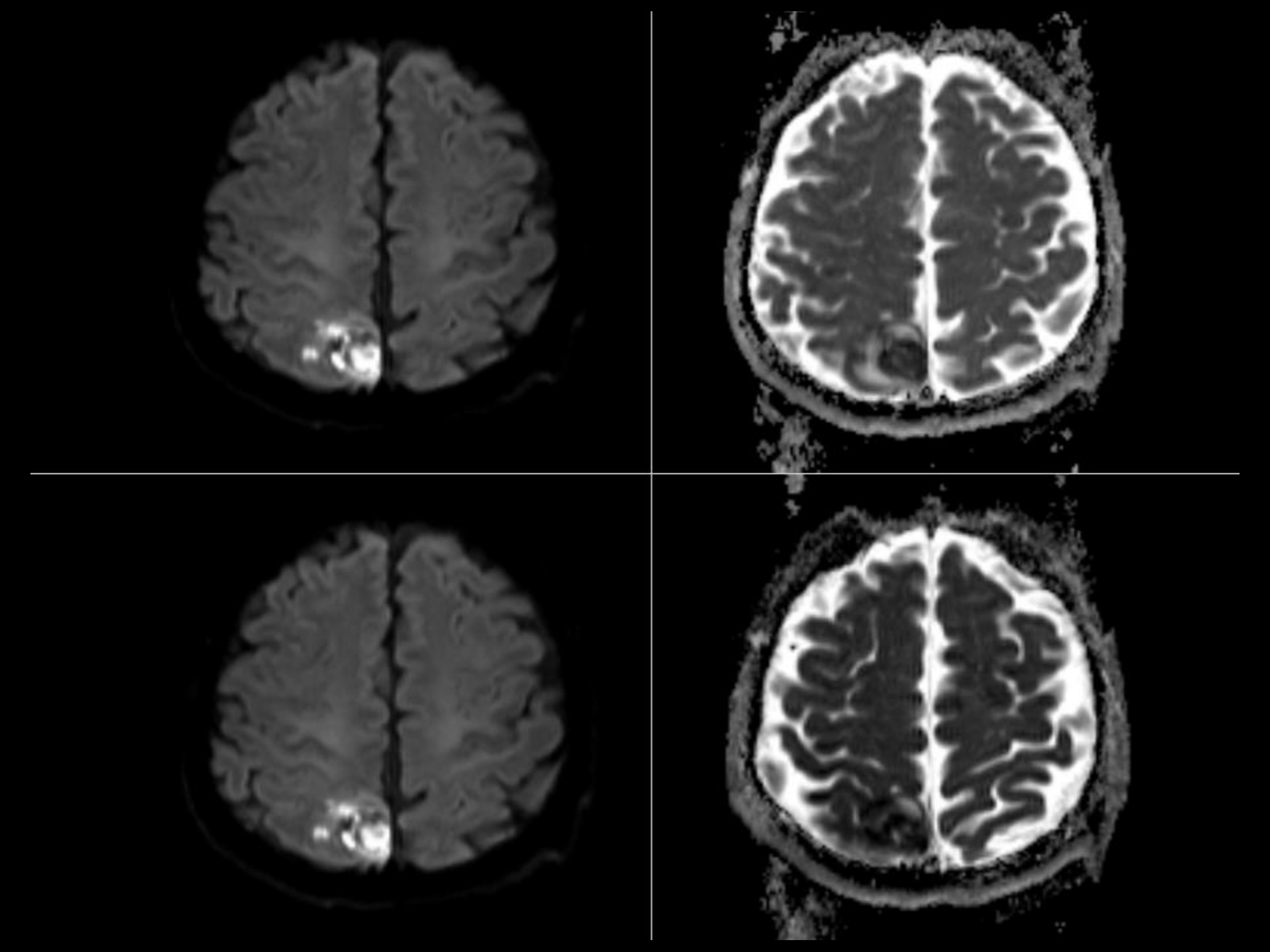
- Diyabete dikkat !!!
  - Kriptokok, kandida (subaraknoid, leptomeninks)
  - Mukor, aspergillus (parankim)

- Granülom, serebrit mantar apsesi
- MORTALİTE YÜKSEK

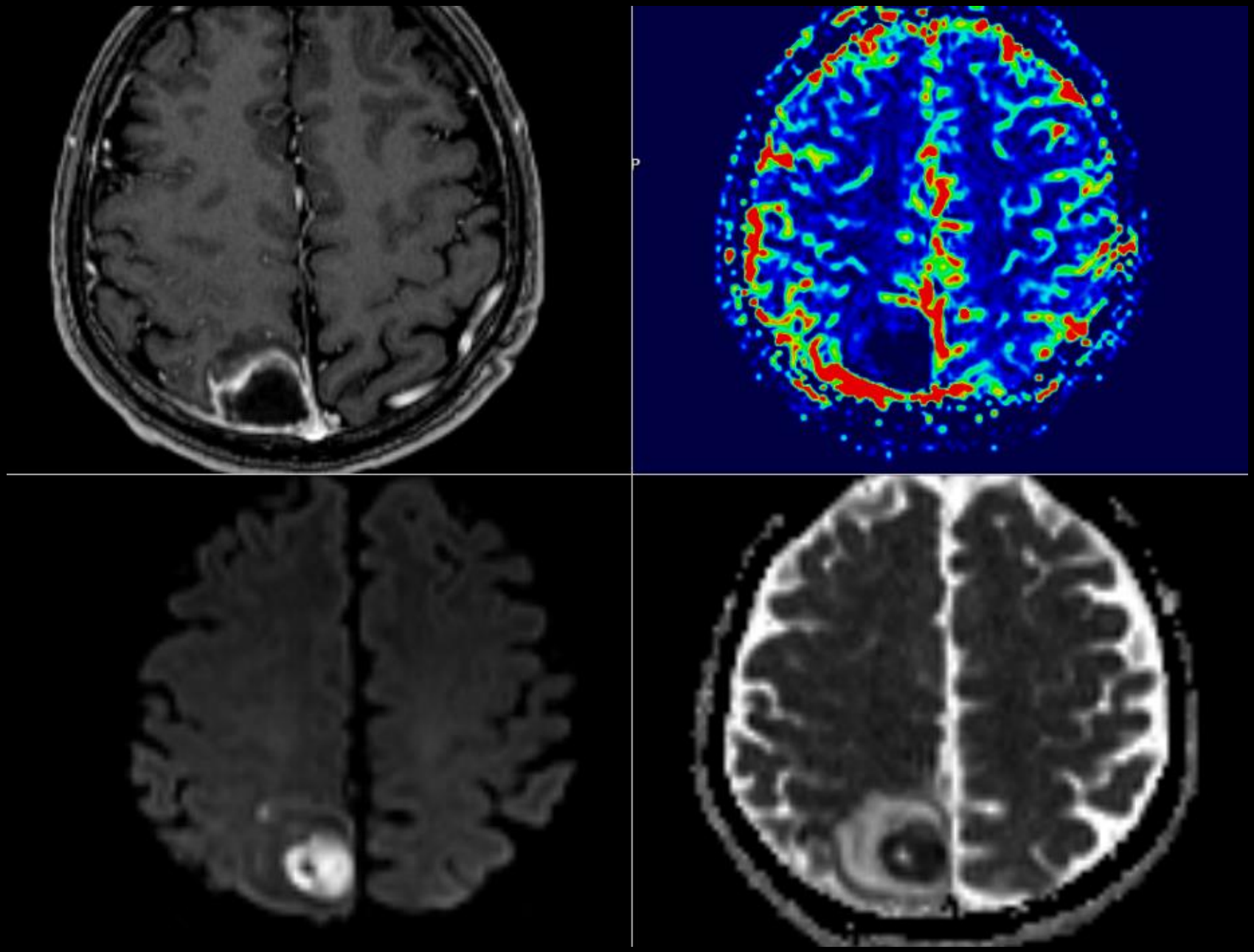
45 y, erkek, nöbet




RPF
Tra>Cor -8
>Sag -0



5 gün sonraki tetkik



- Öyküde diş enfeksiyonu
- Diş kökü apsesi
- Aktinomiçes

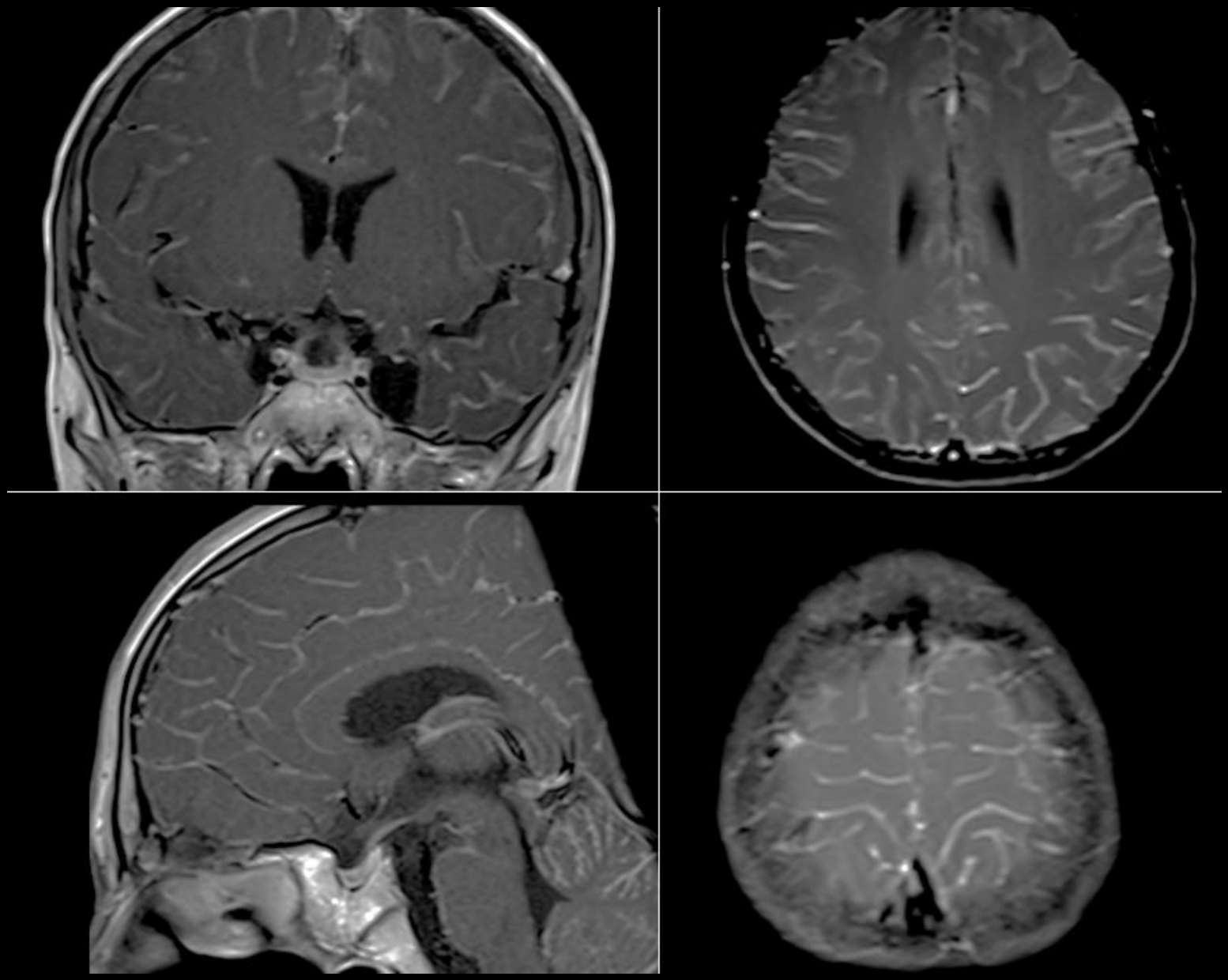
- Operasyon: Mantar apsesi (aktinomiçes)

Kriptokok menenjiti

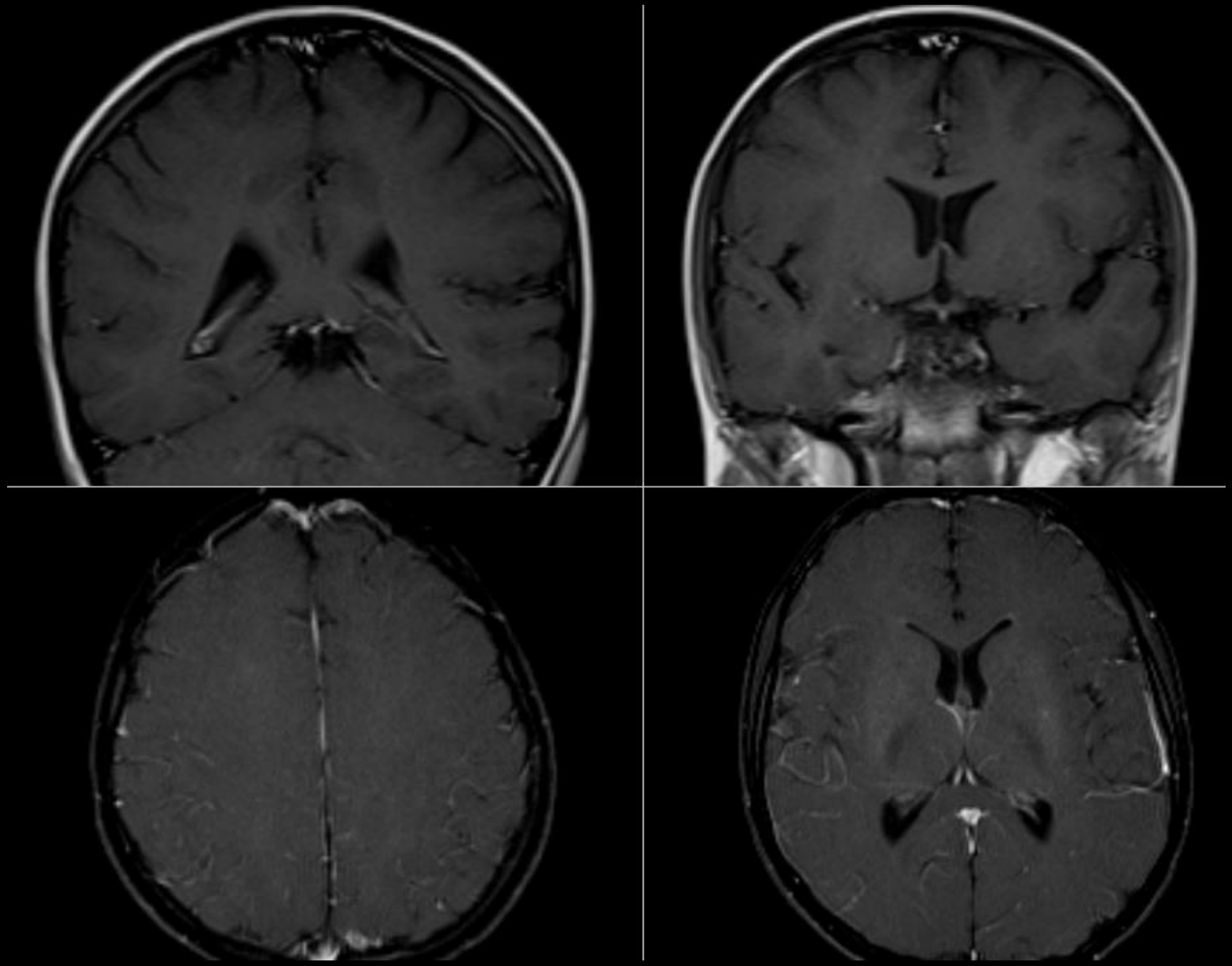
- En sık mantar enfeksiyonu
- HIV !!!!

- Parankimal
- Granülomlar
- Ependimal yüzeylerde ilerleme
- Perivasküler belirginleşme

12 y, Kız



1 yıl sonraki takip MRG

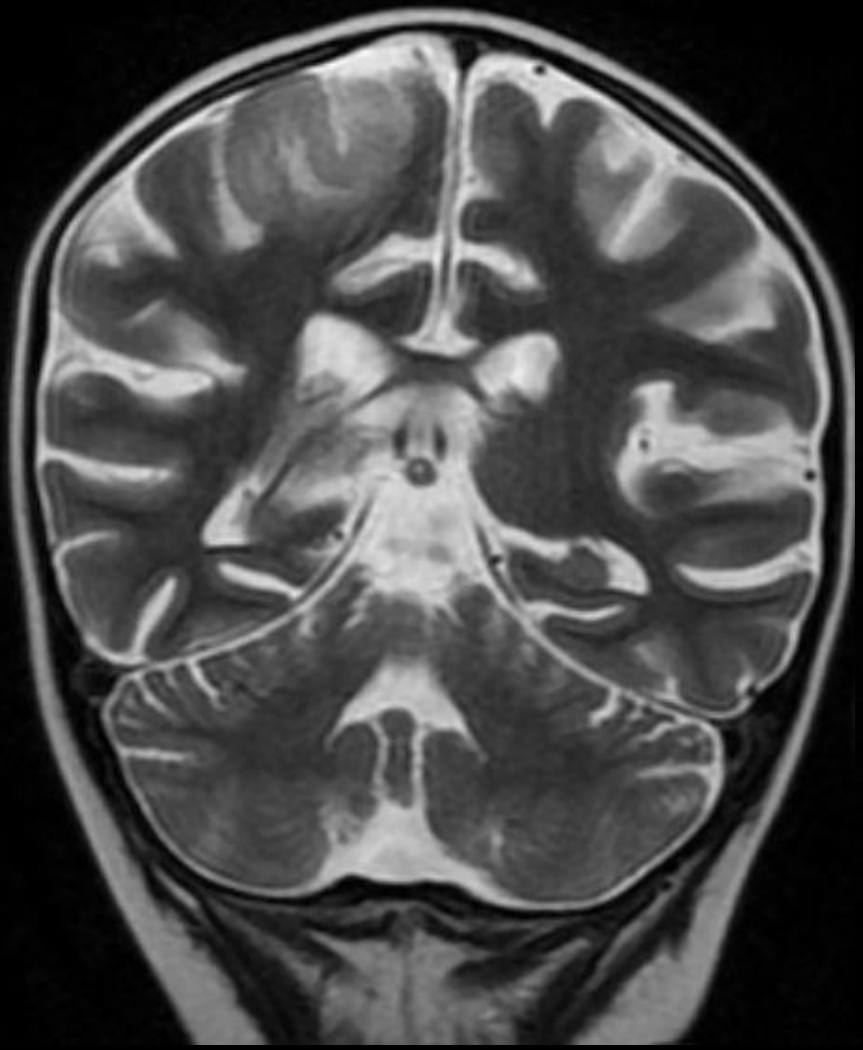


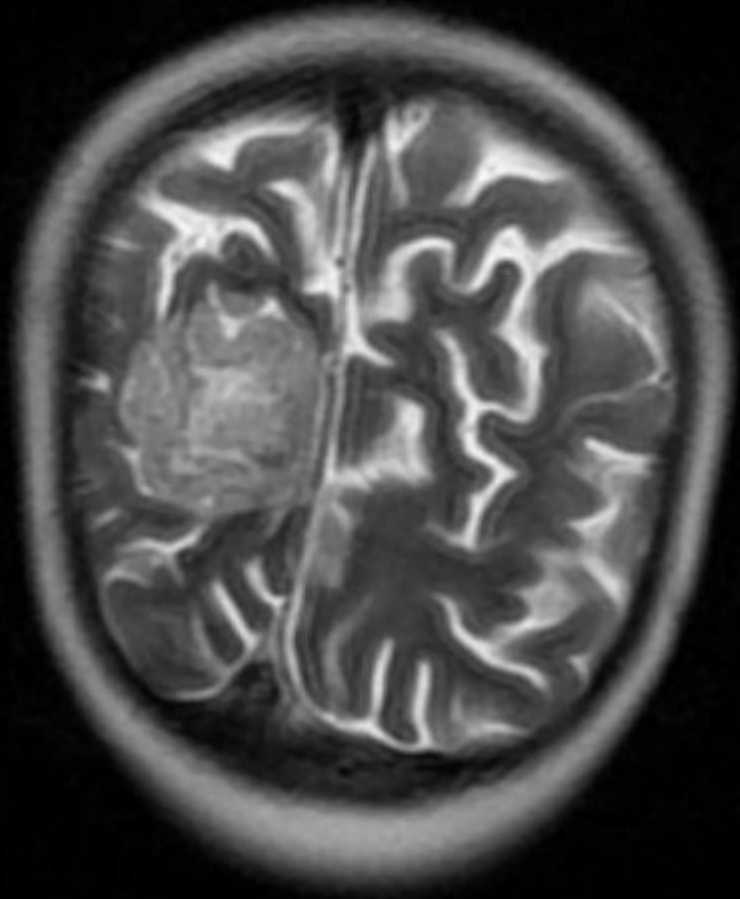
Aspergillus menenjiti

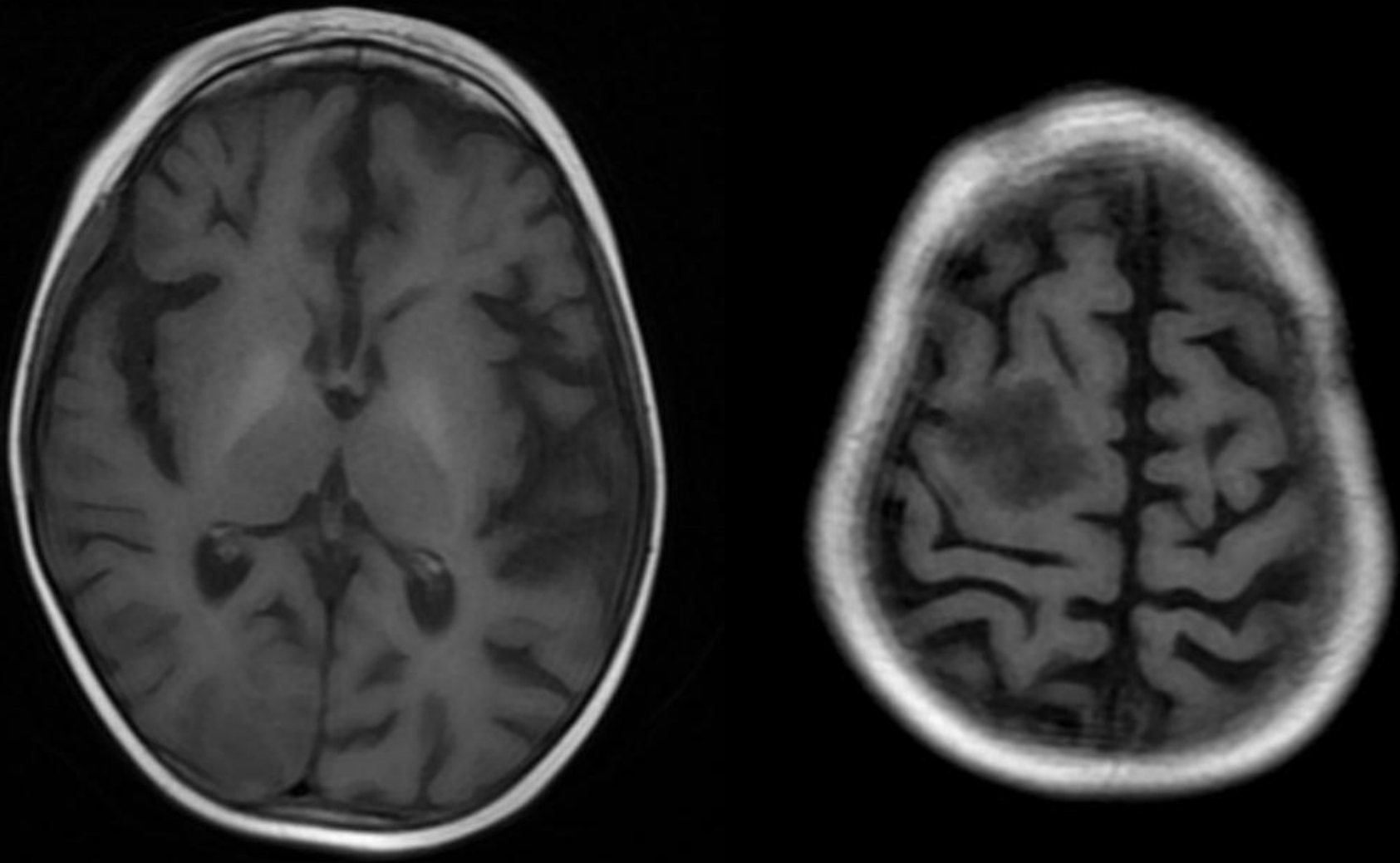
- Hematojen yayılım (pulmoner odak)
- Direkt yayılım (paranazal sinüs)

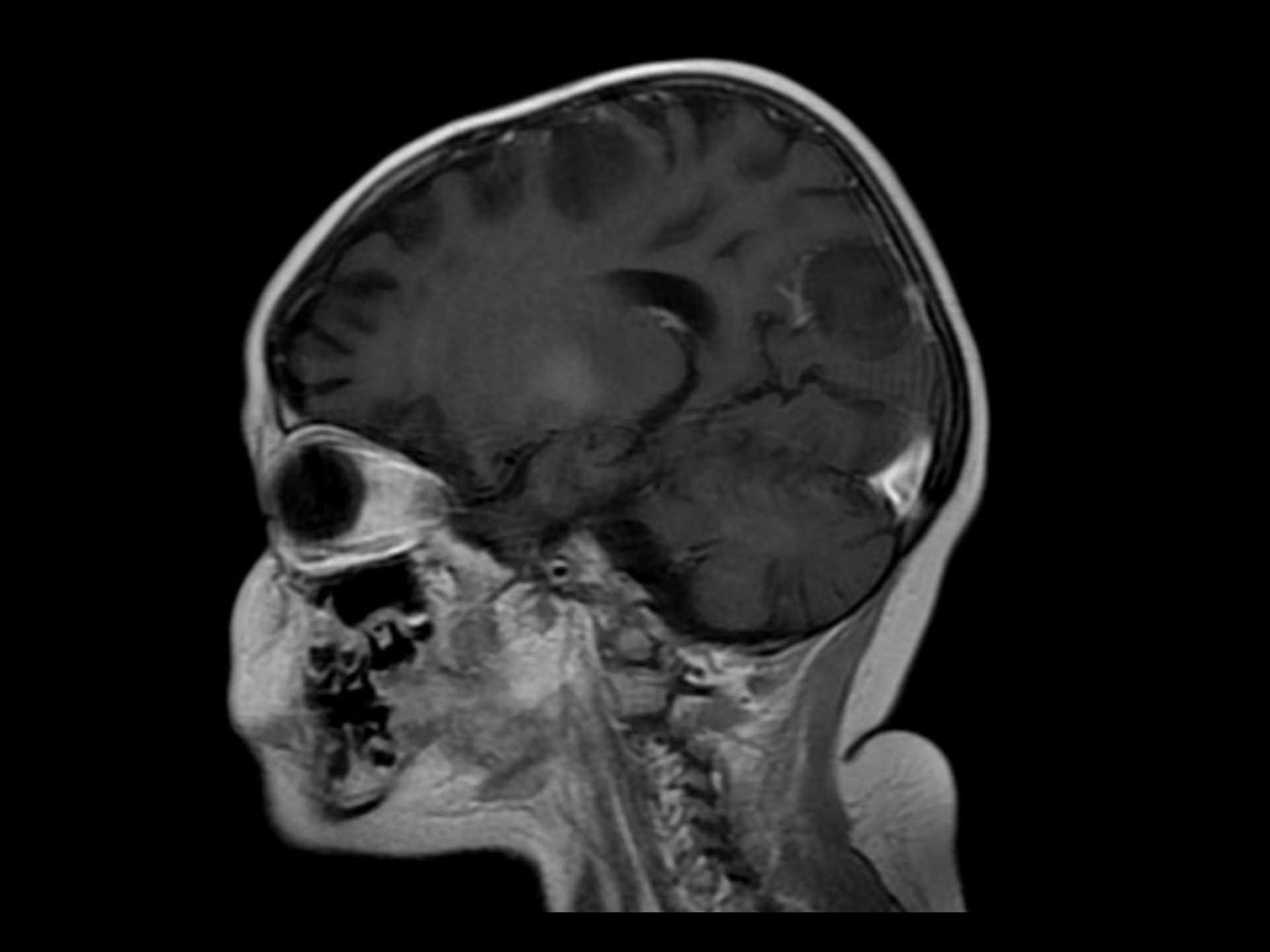
- Meningoensefalit
- Apse
- Vasküler invazyon !! (trombüs, mikotik anevrizma)

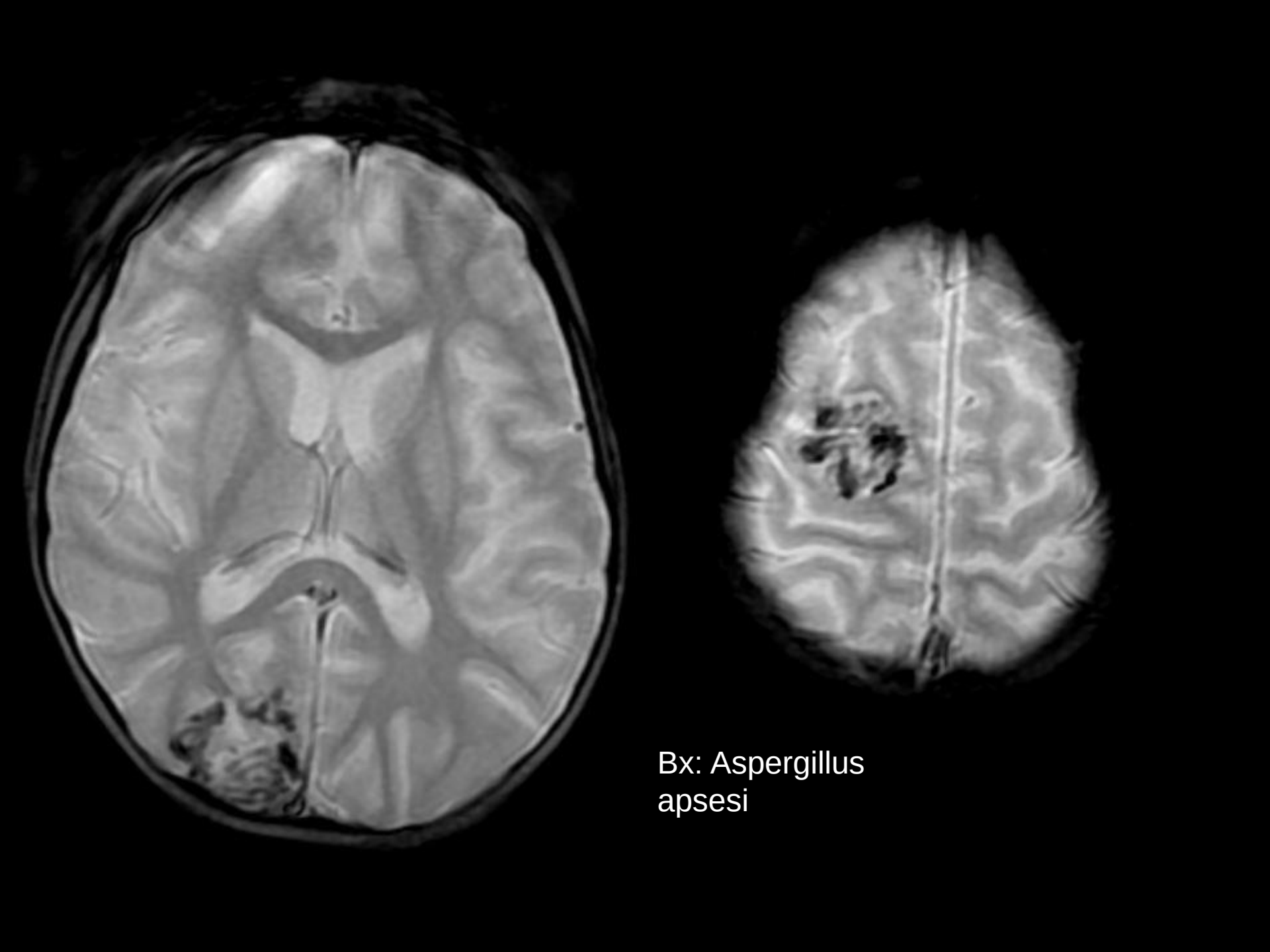
5y , kız, ALL, KİT, KT, klinik kötüleşme



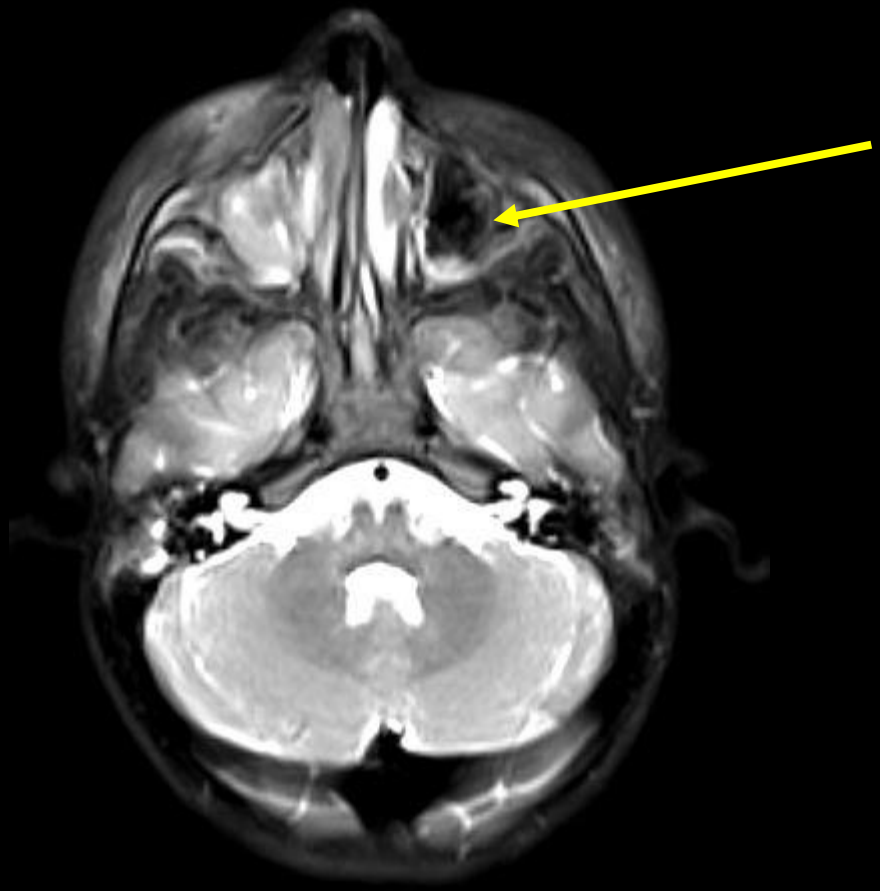








Bx: Aspergillus apsesi



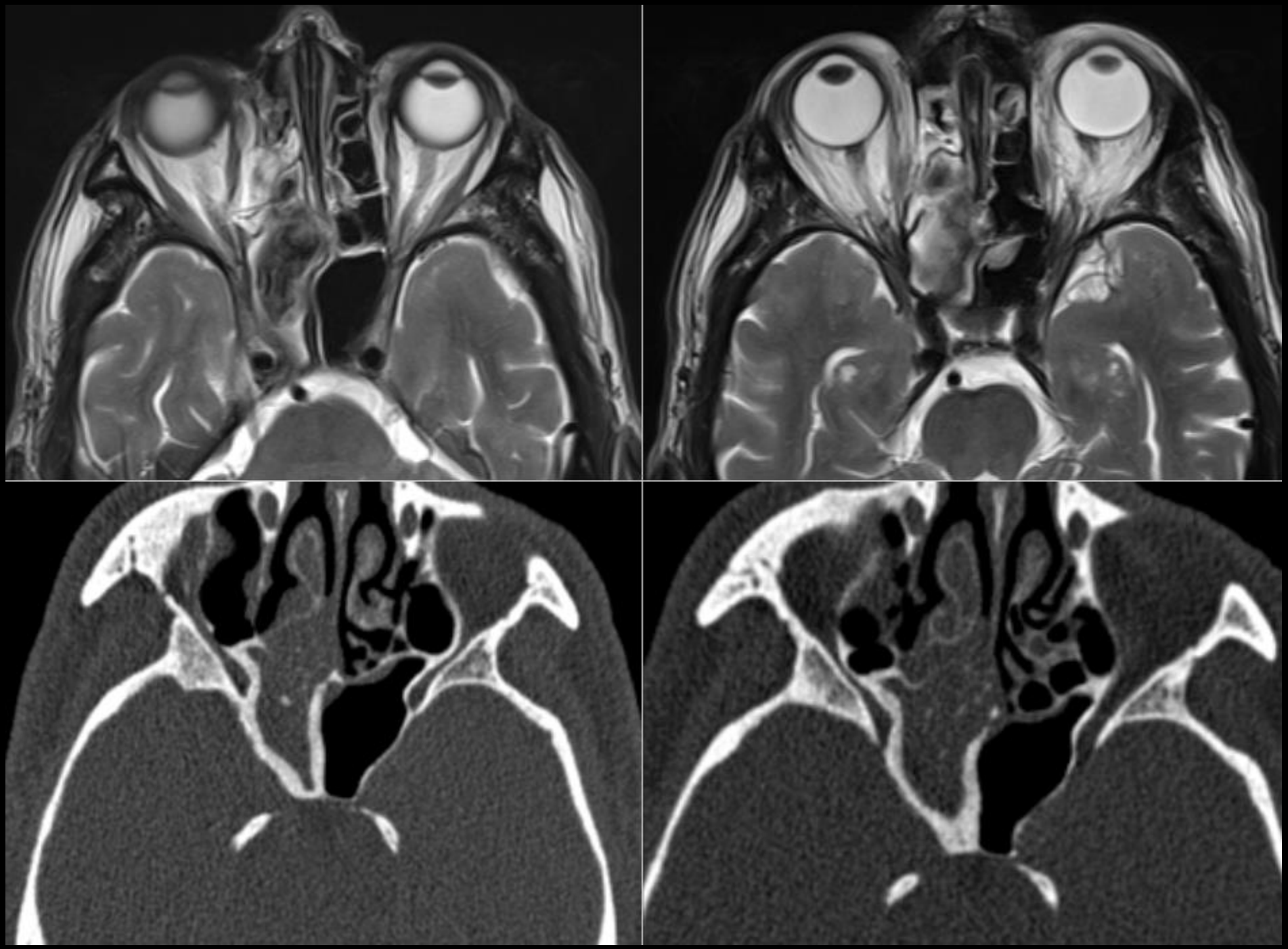
AML hastası, kemoterapi

12. 09. 2012 Paranazal MR

Sinüzit bulguları, sol maksiller sinüs hipointens, mantar enfeksiyonu?

09.10.2012 Toraks BT

Kaviter lezyonlar ve anjiyoinvazif asperjilloz için tipik "mantar topu" görünümleri



Mukormikoz

- İnsidans giderek artmakta
  - Diabet !!
  - Kök hücre / organ nakli

- Paranazal sinüs
- Parankim

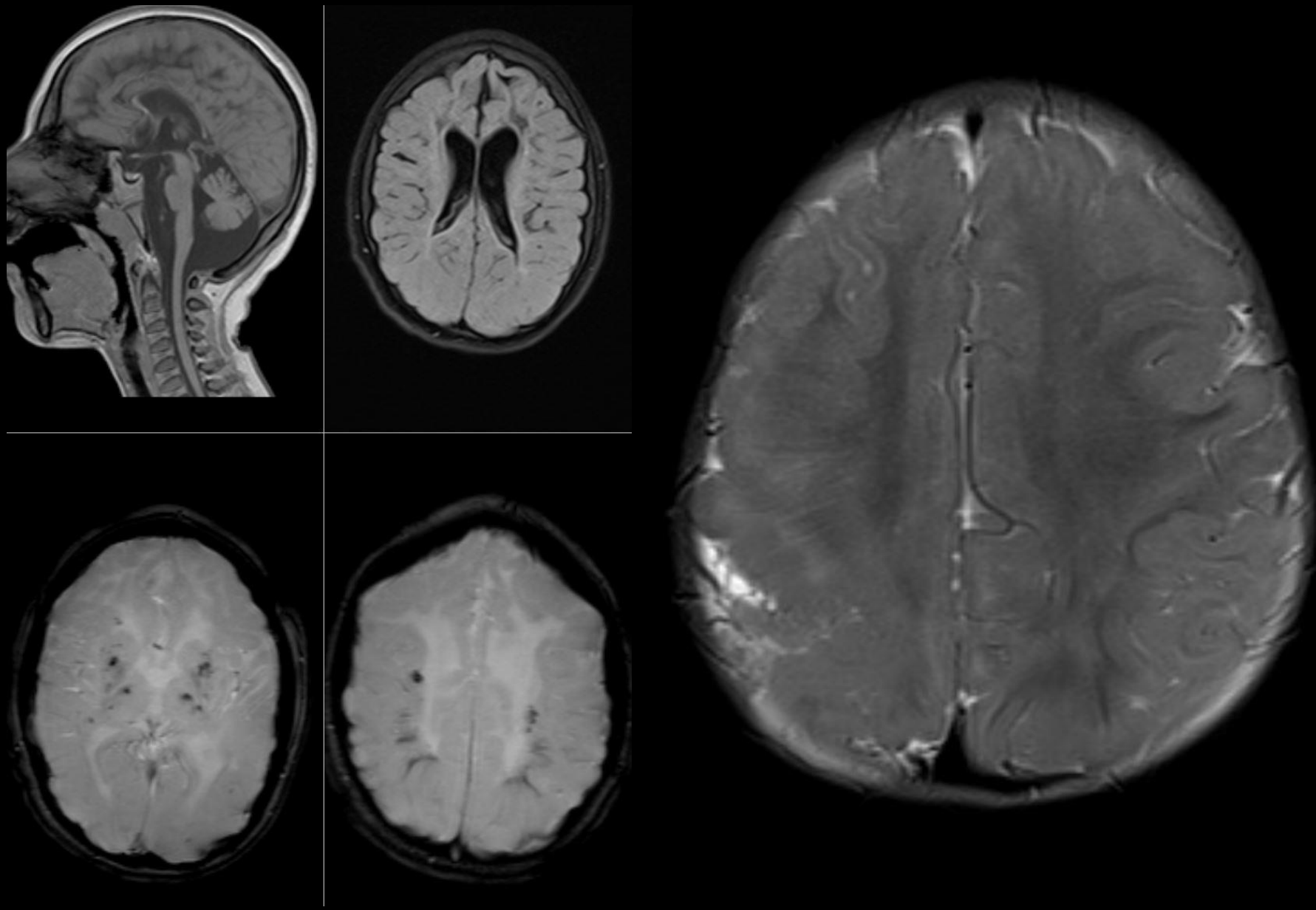
TORCH

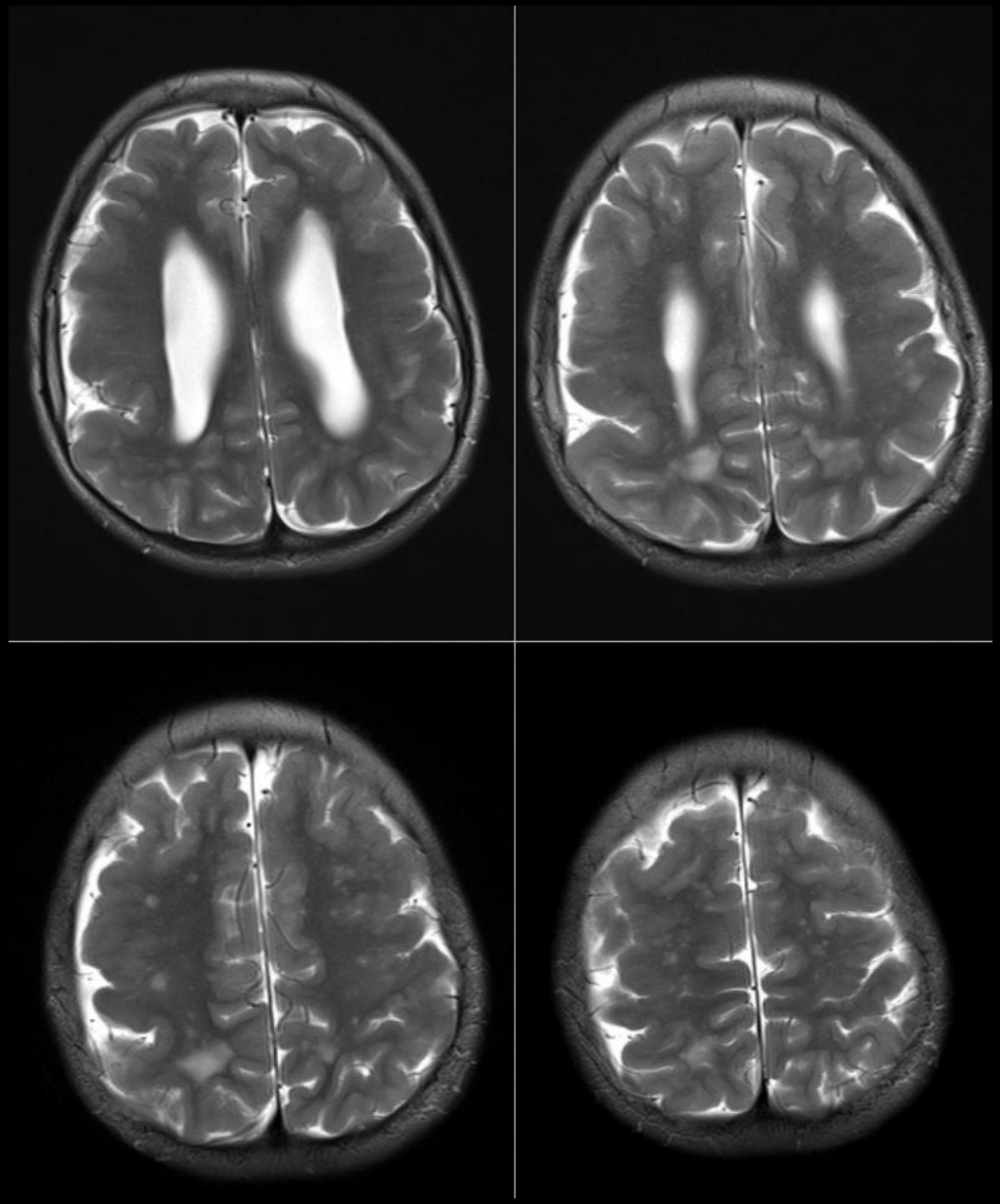
- Pediatrik konjenital enfeksiyonlar
  - Toxoplazma
  - Rubella
  - CMV
  - Herpes
  - Treponema, HIV

Konjenital CMV

- En sık konjenital SSS enfeksiyonu
- Migrasyon anomalileri !!

- Kalsifikasyonlar
- Beyaz cevher intensiteleri
- Ventriküler genişleme





Konjenital Herpes ensefaliti

- HSV tip 2
- HİE ye benzer diffüzyon kısıtlanması alanları (akut dönemde)
- Atrofi, ensefalomalazi, kalsifikasyon, ventriküler genişleme
- Migrasyon anomalisi yapmaz

Backgammon players, Jan Steen, 17. yy