

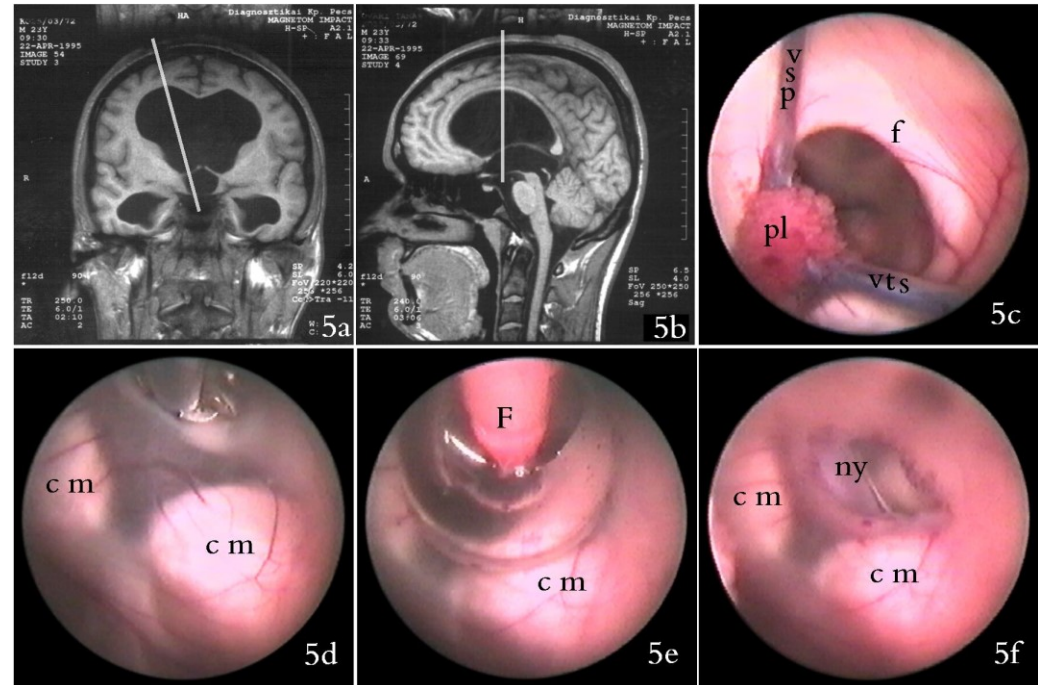
NEURONAVIGÁCIÓ SZEREPE A KAMRADAGANATOK ENDOSZKÓPOS SEBÉSZETÉBEN

Vető Ferenc, Horváth Zsolt, Kövér Ferenc*,
Ottóffy Gábor**

PTE ÁOK Idegsebészeti Klinika, Gyermekklinika**,
Pécsi Diagnosztikai Központ*

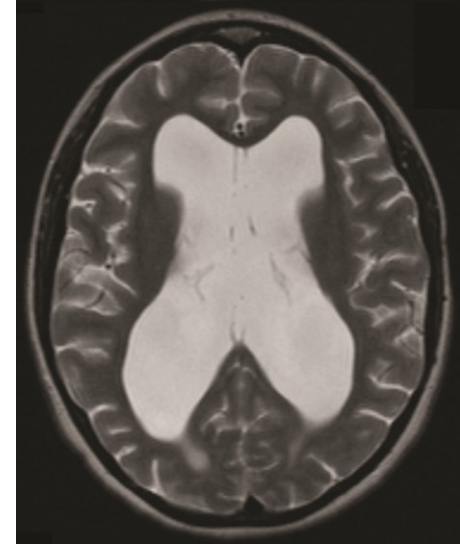
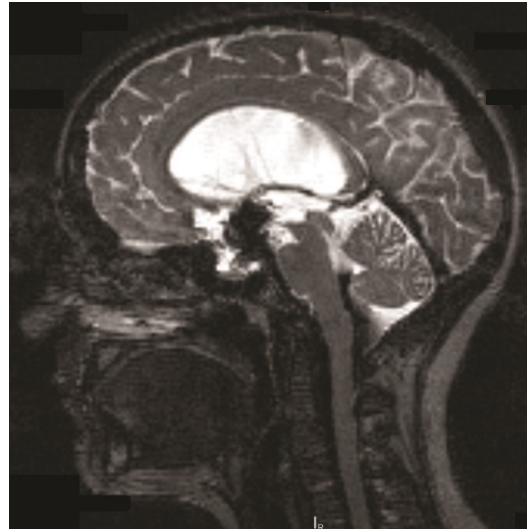
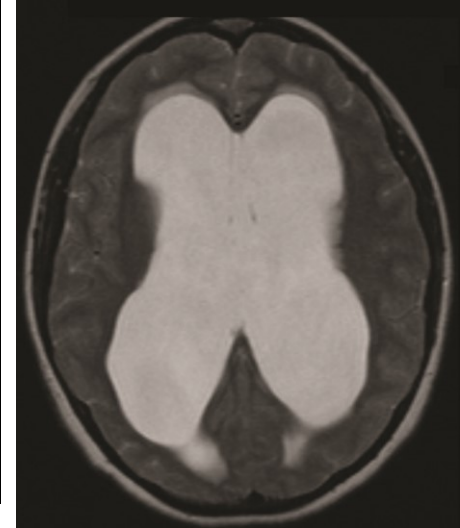
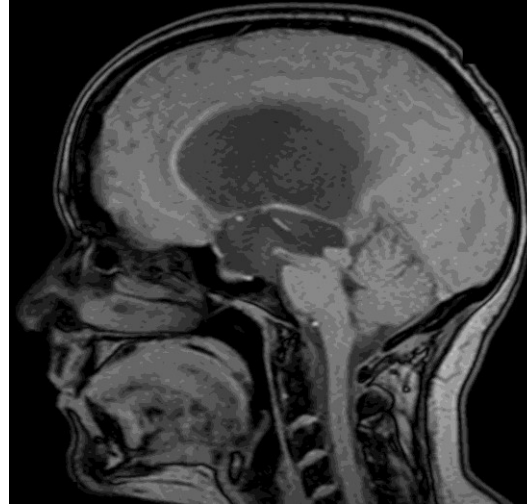
Endoszkópos ventriculostomia

- Liquor-passage akadály esetén kiváltja a shuntbeültetést.
- Csecsemő / gyermekkorban kevésbé hatásos



Másodlagos liquorút-occlusio

- Gyermekkorban gyakori középvonali térfoglalásoknál
- A felszívódási viszonyok nagy valószínűséggel érintetlenek
- Ha az oki gyógyítás nem lehetséges /szükséges



Az endoscopos ventriculostomia előnyei

- A fiziológiához jóval közelebb álló liquorkeringést biztosít.
- Nem kell számolnunk a shuntbeültetés szövődményeivel:
 - fertőzés (shunt-sepsis)
 - túlvezetés
 - mechanikus szövődmények (malpositio, disconnectio, occlusio)
- olcsóbb

III. kamra-környéki térfoglalások

- Endoszkópos szövettani mintavétel a ventriculostomiával egy időben
- a percutan stereotaxiás biopsia veszélyei:
 - liquortérben bizonytalan
 - pinealis regio - 2% mortalitás
 - vérzéscsillapításra nincs esély

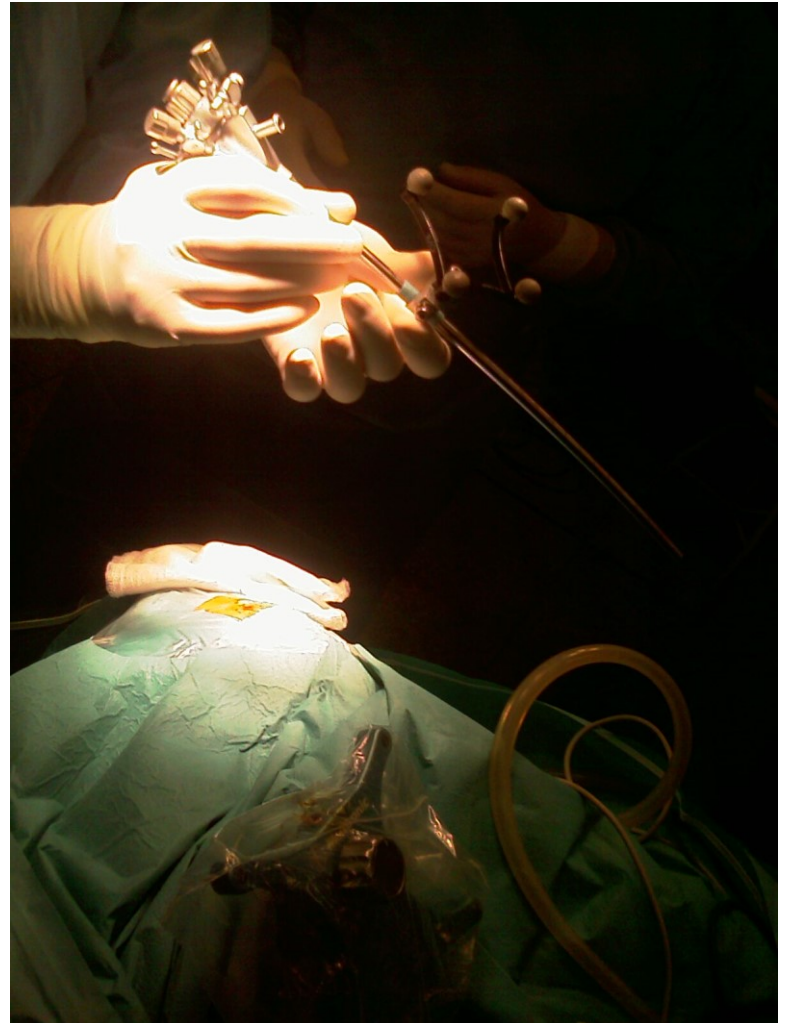
Kettős cél: liquorkeringés+tu.minta

Nehézségek:

- Az endoszkóp tengelyiránytól eltérő mozgatása az agyköpeny szűrcsatornáját tágítja: növeli a roncsolást
- A Monro-nyílás határainak sértése
 - vérzést (plexus, venák)
 - memoria-zavart (fornix) okozhat

Megoldás: neuronavigatio

- Kiválasztható az optimális behatolási pont, mely a képletek rugalmasságát, eltarthatóságát is figyelembe véve, lehetővé teszi mindkét cél elérését, ha a térfoglalás a III. kamra elülső felében helyezkedik el



1. beteg

III. kamra arachnoidealis cysta

+

tectum glioma

KO
*94/02/24
04/08/31
18:16:28.51
2 IMA 11
SEQ 12
SP -83.5



Balance KO
VA47C *94/02/24
H-SP-CR 04/08/31
18:16:31.53
2 IMA 12
SEQ 13
SP -78.5



Balance
VA47C
H-SP-CR

kV 130
mAs 260
TI 2.0
GT 5.0
SL 5.0
225 0/-7
H30s L1T0

W 88
C 35
H30s L1T0

W 88
C 35

AF

Pecsi Diagnosztikai Központ

AF

Pecsi Diagnosztikai Központ

*94/02/24
04/08/31
18:16:45.82
3 IMA 3
SEQ 16
SP -53.5



Balance KO
VA47C *94/02/24
H-SP-CR 04/08/31
18:16:49.34
3 IMA 4
SEQ 17
SP -43.5



Balance
VA47C
H-SP-CR

kV 130
mAs 260
TI 2.0
GT 5.0
SL 10.0
225 0/-7
H30s L1T0

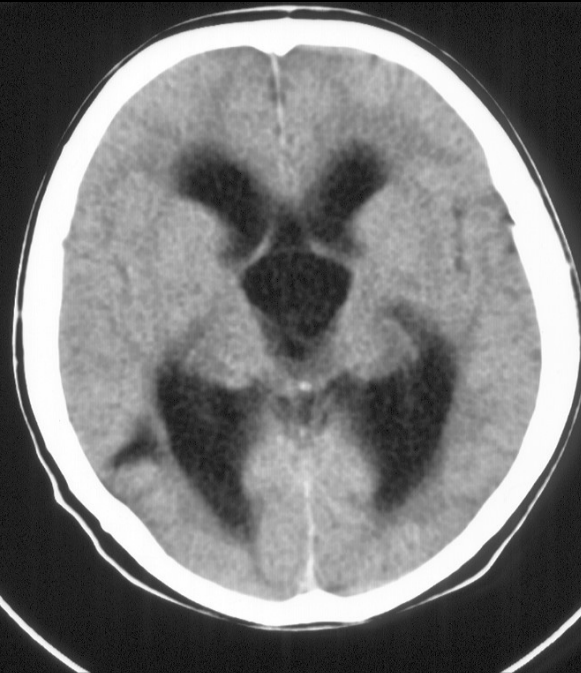
W 60
C 27
H30s L1T0

W 60
C 27

KO
*94/02/24
04/08/31
18:16:38.79
3 IMA 1
SEQ 14
SP -73.5



Balance KO
VA47C *94/02/24
H-SP-CR 04/08/31
18:16:42.31
3 IMA 2
SEQ 15
SP -63.5

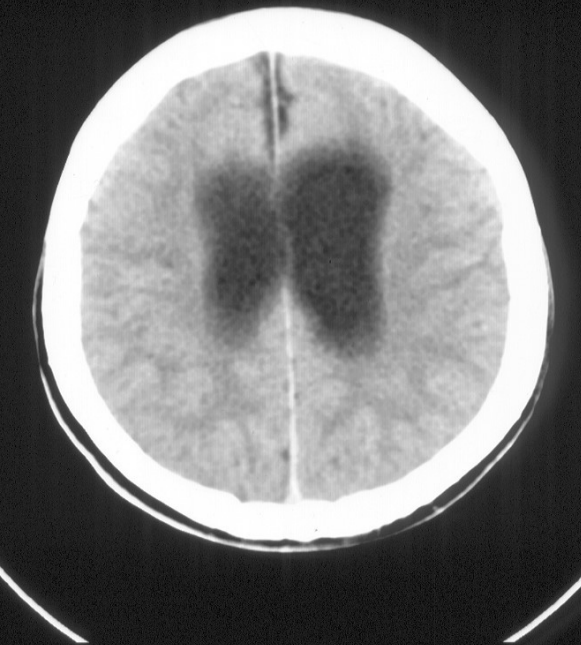


Balance
VA47C
H-SP-CR

KO
*94/02/24
04/08/31
18:16:52.86
3 IMA 5
SEQ 18
SP -33.5



Balance KO
VA47C *94/02/24
H-SP-CR 04/08/31
18:16:56.38
3 IMA 6
SEQ 19
SP -23.5



Balance
VA47C
H-SP-CR

K024/2/94
24-FEB-1994
10:54
01-FEB-2002
IMAGE 65
SER 1-4

MF 1.25

AL

f12d 90
*
TR 250.0
TE 6.0/1
TA 01:54
AC 2

VT

HLP

MAGNETOM IMPACT
H-SP VB33D
+ : F A L

K024/2/94
24-FEB-1994
10:54
01-FEB-2002
IMAGE 66
SER 1-4

MF 1.25

AL

f12d 90
*
TR 250.0
TE 6.0/1
TA 01:54
AC 2

VT

HLP

MAGNETOM IMPACT
H-SP VB33D
+ : F A L

f12d 90
*
TR 250.0
TE 6.0/1
TA 01:54
AC 2

W 448
C 266

K024/2/94
24-FEB-1994
10:54
01-FEB-2002
IMAGE 67
SER 1-4

MF 1.25

AL

f12d 90
*
TR 250.0
TE 6.0/1
TA 01:54
AC 2

VT

HLP

Pecsi Diagnosztikai Kp.
MAGNETOM IMPACT
H-SP VB33D
+ : F A L

K024/2/94
24-FEB-1994
10:54
01-FEB-2002
IMAGE 68
SER 1-4

MF 1.25

AL

f12d 90
*
TR 250.0
TE 6.0/1
TA 01:54
AC 2

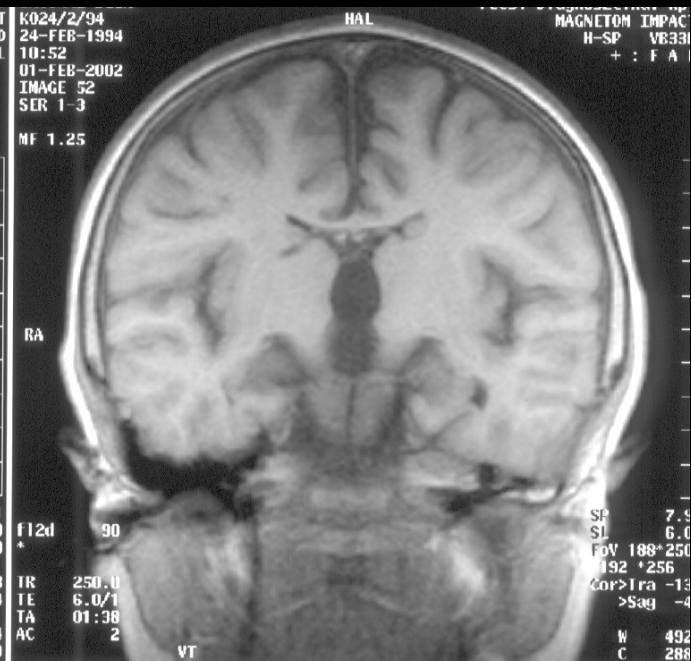
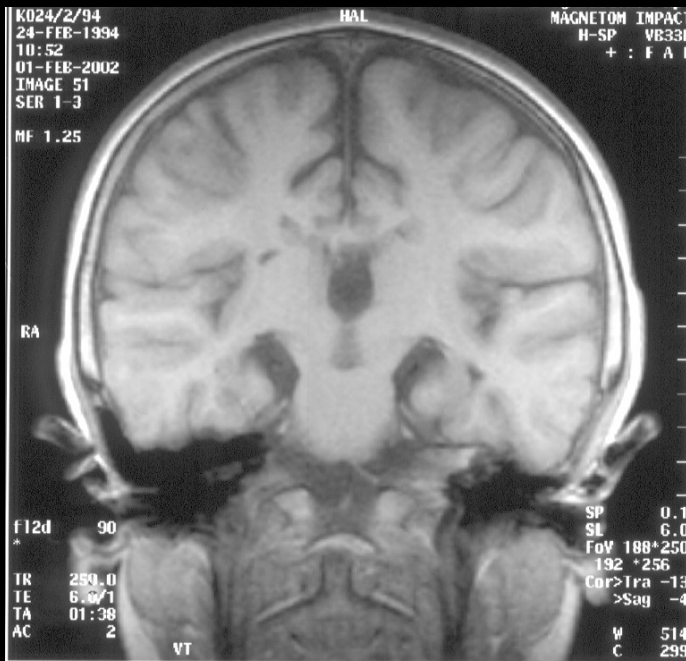
VT

HLP

Pecsi Diagnosztikai Kp.
MAGNETOM IMPACT
H-SP VB33D
+ : F A L

f12d 90
*
TR 250.0
TE 6.0/1
TA 01:54
AC 2

W 448
C 266

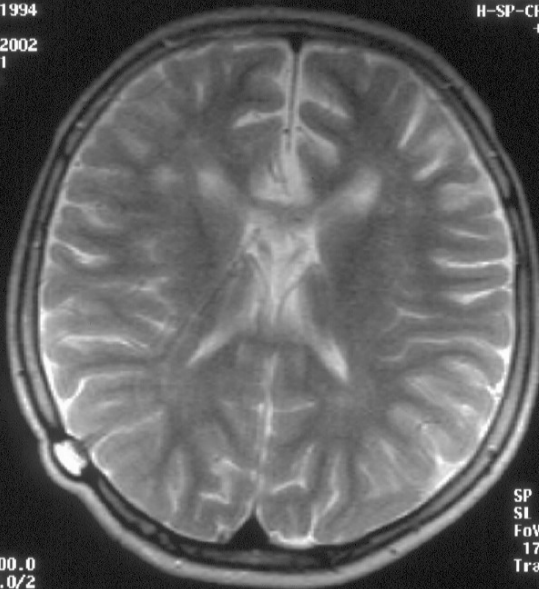


K024/2/94
24-FEB-1994
10:48
01-FEB-2002
IMAGE 31
SER 1-2

AF

MAGNETOM IMPACT
H-SP-CR VB33D
+ : F A L

RHA



tse2

TR 4000.0
TE 90.0/2
TA 02:25
AC 1

SP -32.3
SL 6.0
FoV 185*211
170 *256os
Tra>Cor 8
>Sag 1
W 536
C 343

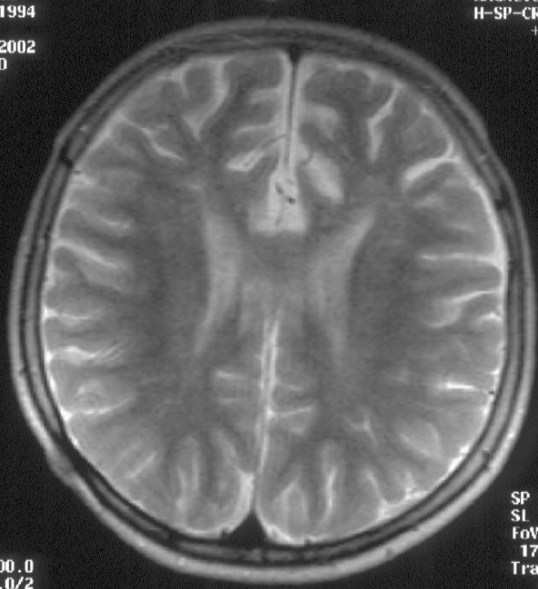
VT

K024/2/94
24-FEB-1994
10:48
01-FEB-2002
IMAGE 30
SER 1-2

AF

MAGNETOM IMPACT
H-SP-CR VB33D
+ : F A L

RHA



tse2

TR 4000.0
TE 90.0/2
TA 02:25
AC 1

SP -39.5
SL 6.0
FoV 185*211
170 *256os
Tra>Cor 8
>Sag 1
W 536
C 343

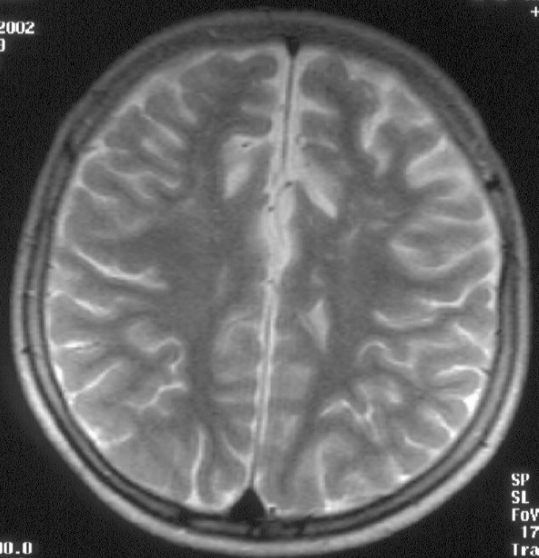
VT

K024/2/94
24-FEB-1994
10:48
01-FEB-2002
IMAGE 29
SER 1-2

AF

Pecsi Diagnosztikai Kp.
MAGNETOM IMPACT
H-SP-CR VB33D
+ : F A L

RHA



tse2

TR 4000.0
TE 90.0/2
TA 02:25
AC 1

SP -46.7
SL 6.0
FoV 185*211
170 *256os
Tra>Cor 8
>Sag 1
W 536
C 332

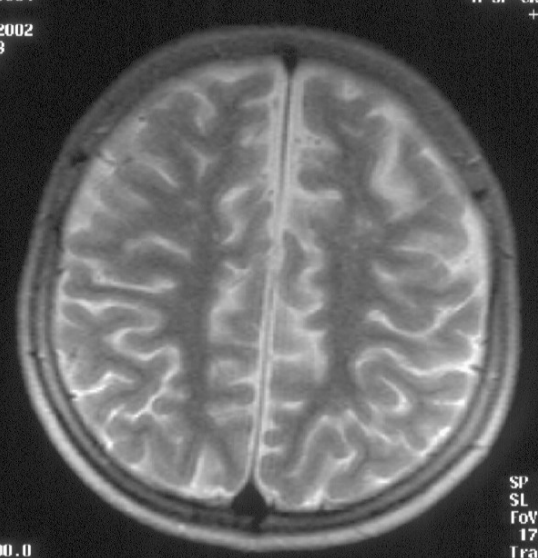
VT

K024/2/94
24-FEB-1994
10:48
01-FEB-2002
IMAGE 28
SER 1-2

AF

Pecsi Diagnosztikai Kp.
MAGNETOM IMPACT
H-SP-CR VB33D
+ : F A L

RHA

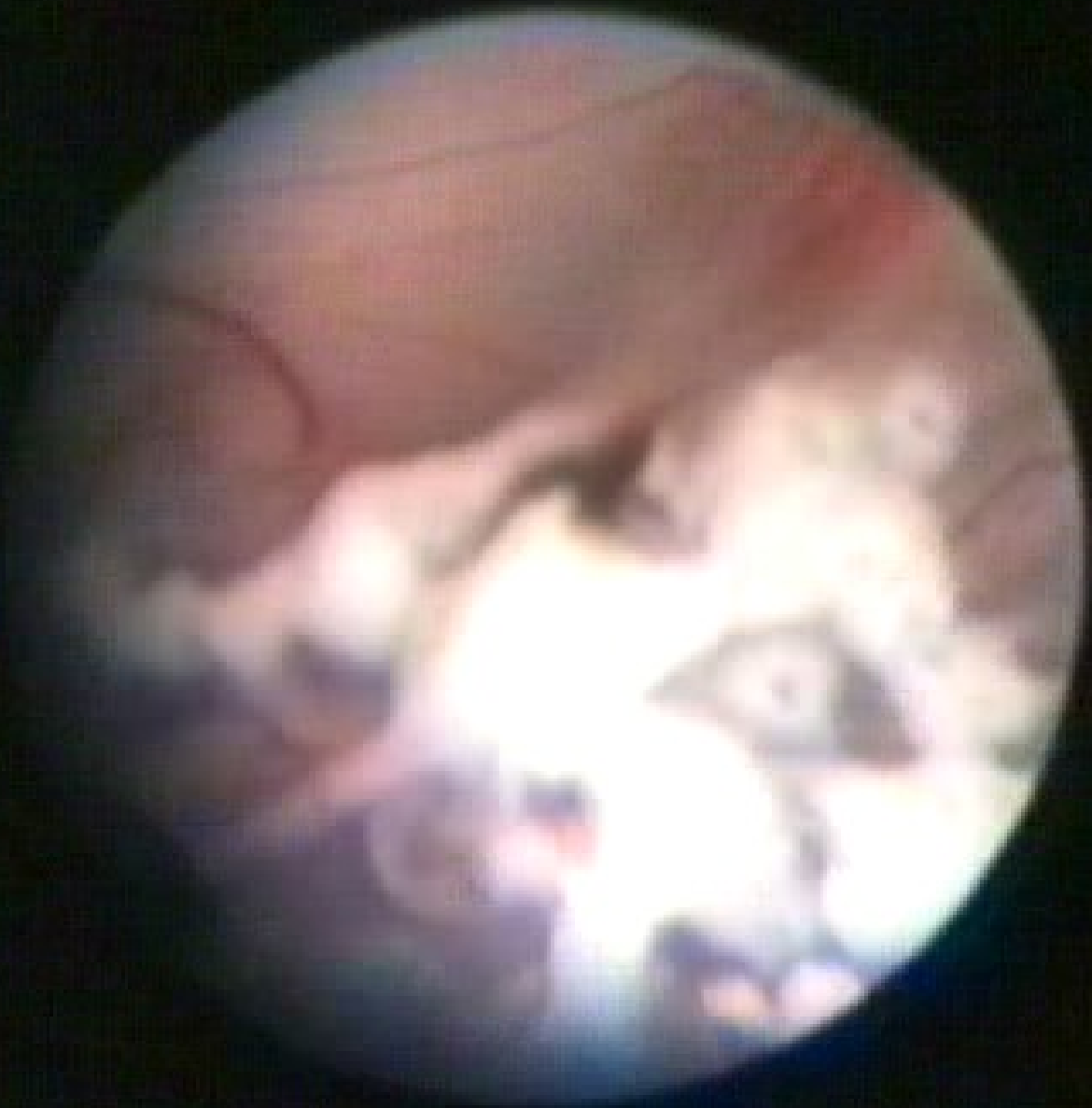


tse2

TR 4000.0
TE 90.0/2
TA 02:25
AC 1

SP -53.9
SL 6.0
FoV 185*211
170 *256os
Tra>Cor 8
>Sag 1
W 536
C 332

VT



KO
*94/02/24:10Y
STUDY 2
04/09/14
09:27:42
4 IMA 6 / 20

AL

MF 1.11

TR 180.0
TE 4.1
TA 56.34
BW 260.0
M/ND

A2
HE
*fl2d1 / 70



HarmonyExpert
MR 2002B
HFS
+LPH
KO
*94/02/24:10Y
STUDY 2
04/09/14
09:27:42
4 IMA 7 / 20

AL

MF 1.11

D TR 180.0
TE 4.1
TA 56.34
SL 5.0 BW 260.0
M/ND

SP R36.4
Fov 219*250
314*512 I
Sag>Tra(-2.2)>Cor(-0.5)
A2
W 934 HE
C 482 *fl2d1 / 70



HarmonyExpert
MR 2002B
HFS
+LPH

AL

MF 1.11

D TR 180.0
TE 4.1
TA 56.34
SL 5.0 BW 260.0
M/ND

SP R30.7
Fov 219*250
314*512 I
Sag>Tra(-2.2)>Cor(-0.5)
A2
W 934 HE
C 482



KO
*94/02/24:10Y
STUDY 2
04/09/14
09:27:43
4 IMA 11 / 20

AL

MF 1.11

TR 180.0
TE 4.1
TA 56.34
BW 260.0
M/ND

A2
HE
*fl2d1 / 70



HRA

Pecsi Diagnosztikai Központ

HarmonyExpert
MR 2002B
HFS
+LPH
KO
*94/02/24:10Y
STUDY 2
04/09/14
09:27:42
4 IMA 12 / 20

AL

MF 1.11

D TR 180.0
TE 4.1
TA 56.34
SL 5.0 BW 260.0
M/ND

SP R7.7
Fov 219*250
314*512 I
Sag>Tra(-2.2)>Cor(-0.5)
A2
W 934 HE
C 482 *fl2d1 / 70



HRA

Pecsi Diagnosztikai Központ

HarmonyExpert
MR 2002B
HFS
+LPH

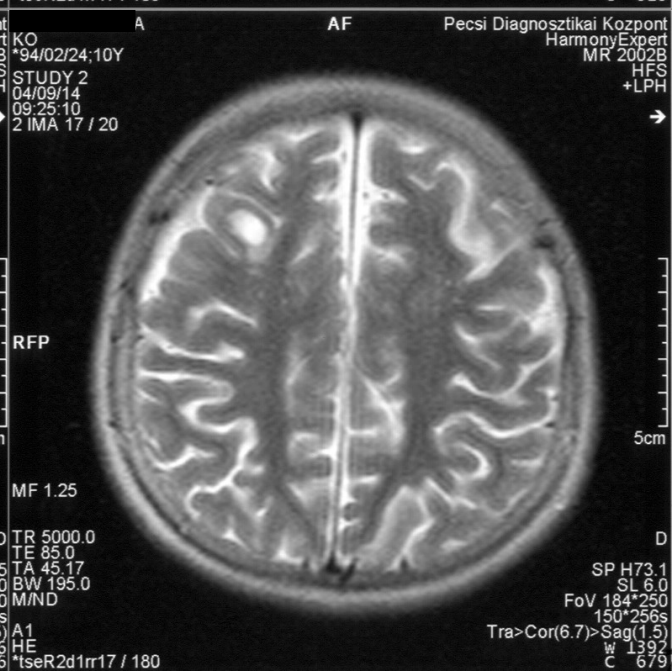
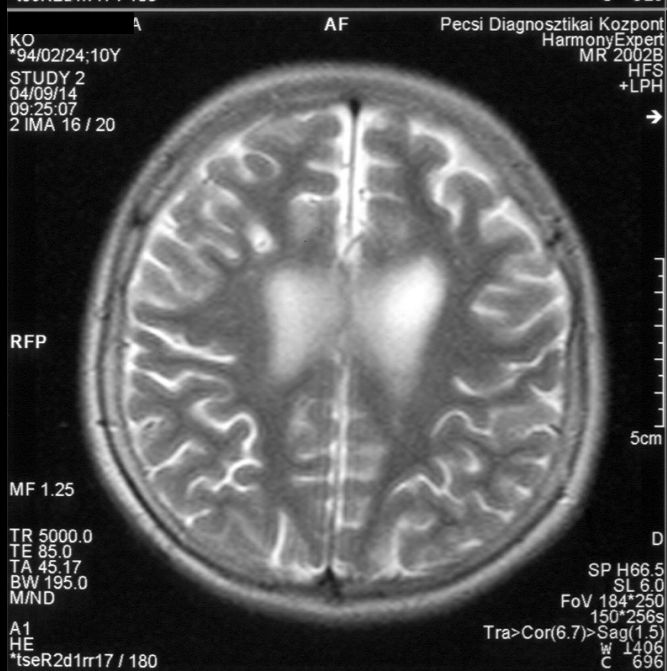
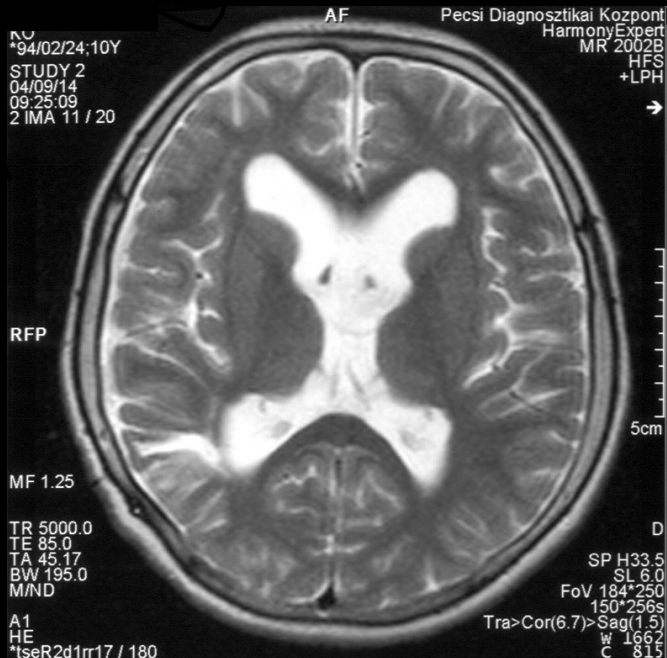
AL

MF 1.11

D TR 180.0
TE 4.1
TA 56.34
SL 5.0 BW 260.0
M/ND

SP R1.9
Fov 219*250
314*512 I
Sag>Tra(-2.2)>Cor(-0.5)
A2
W 934 HE
C 482





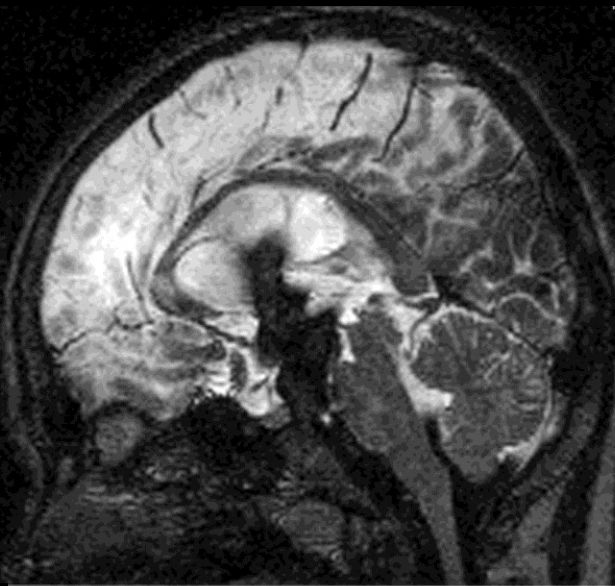
*94/02/24;10Y
STUDY 2
04/09/14
09:31:07
5 IMA 9 / 15

AL

MF 1.49

TR 30.0
TE 5.8
TA 03:04
BW 130.0
M/ND

A2
HE
*ps3d1rs / 30

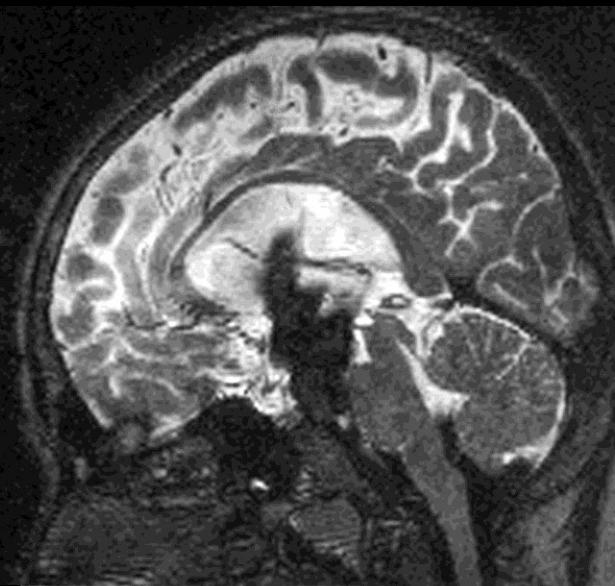


MR 20028
HFS
+LPH
→
*94/02/24;10Y
STUDY 2
04/09/14
09:31:07
5 IMA 10 / 15

AL

MF 1.49

D TR 30.0
TE 5.8
SP R11.6 TA 03:04
SL 2.0 BW 130.0
FoV 203*270 M/ND
192*256
Sag>Cor(-3.4) A2
W 428 HE
C 1/1 *ps3d1rs / 30



MR 20028
HFS
+LPH
→

D

MF 1.49

SP R9.6
SL 2.0
FoV 203*270
192*256
Sag>Cor(-3.4)
W 406
C 161

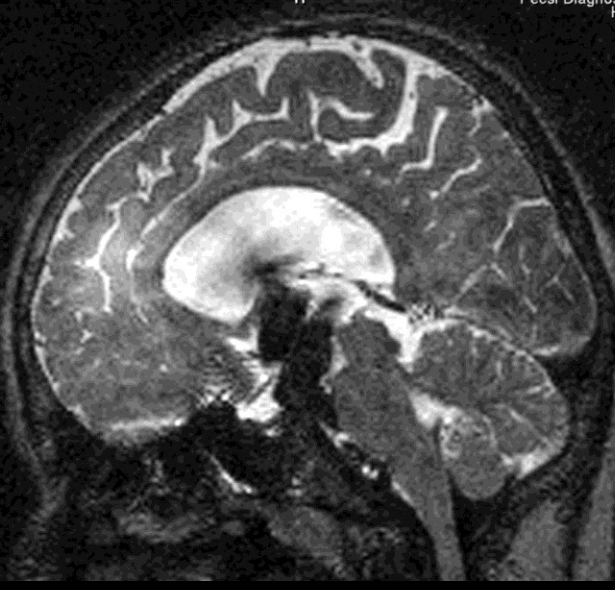
KO
*94/02/24;10Y
STUDY 2
04/09/14
09:31:07
5 IMA 12 / 15

AL

MF 1.49

TR 30.0
TE 5.8
TA 03:04
BW 130.0
M/ND

A2
HE
*ps3d1rs / 30



H
Pecsi Diagnosztikai Központ
HarmonyExpert

MR 20028
HFS
+LPH
→
*94/02/24;10Y
STUDY 2
04/09/14
09:31:07
5 IMA 13 / 15

AL

MF 1.49

D TR 30.0
TE 5.8
SP R5.6 TA 03:04
SL 2.0 BW 130.0
FoV 203*270 M/ND
192*256
Sag>Cor(-3.4) A2
W 369 HE
C 1/1 *ps3d1rs / 30



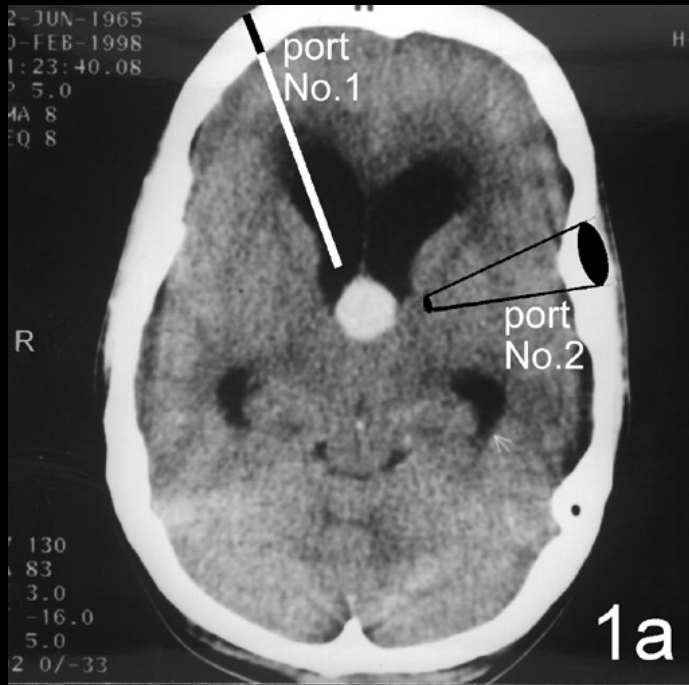
H
Pecsi Diagnosztikai Központ
HarmonyExpert

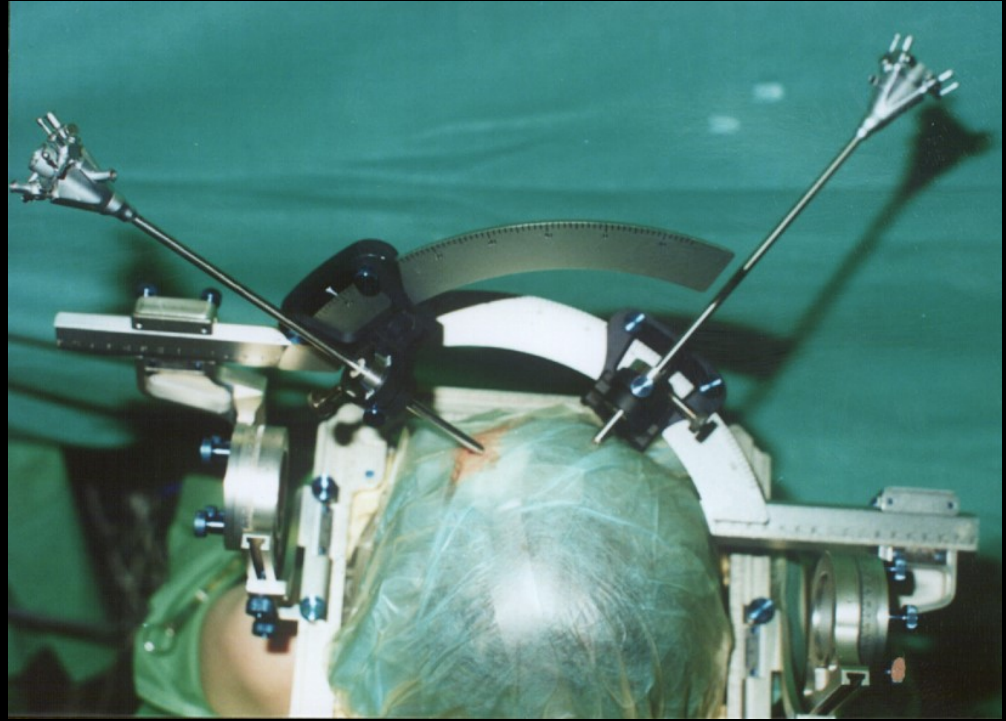
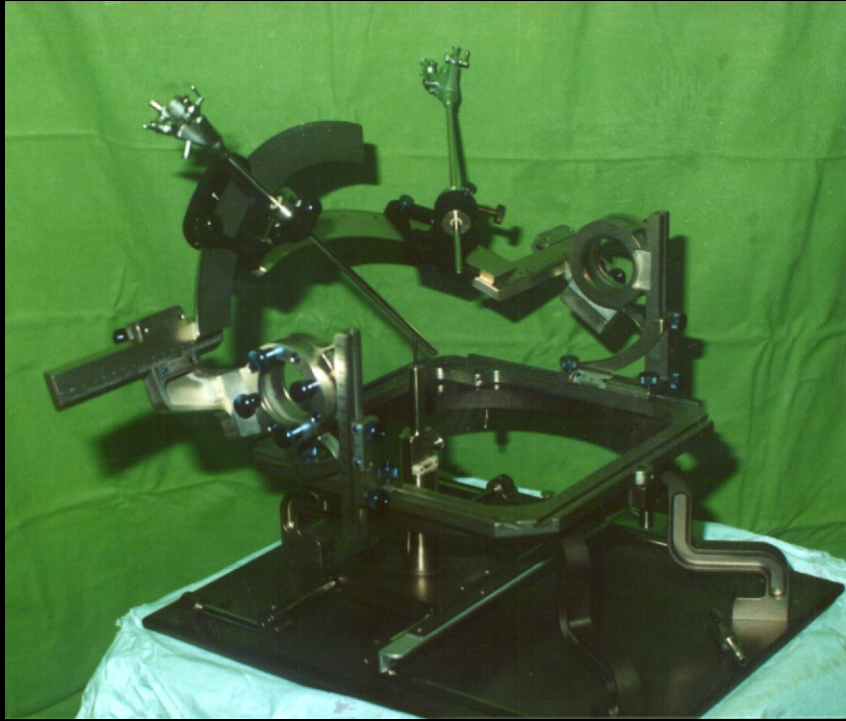
MR 20028
HFS
+LPH
→

D

MF 1.49

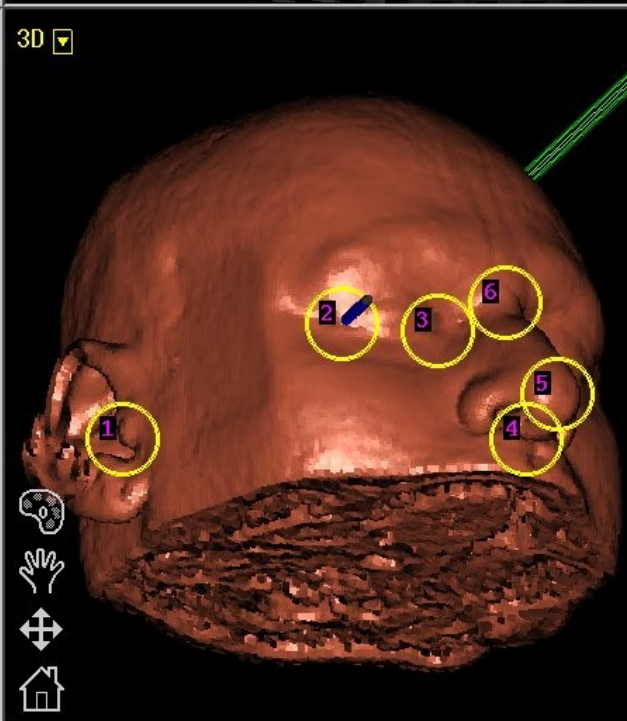
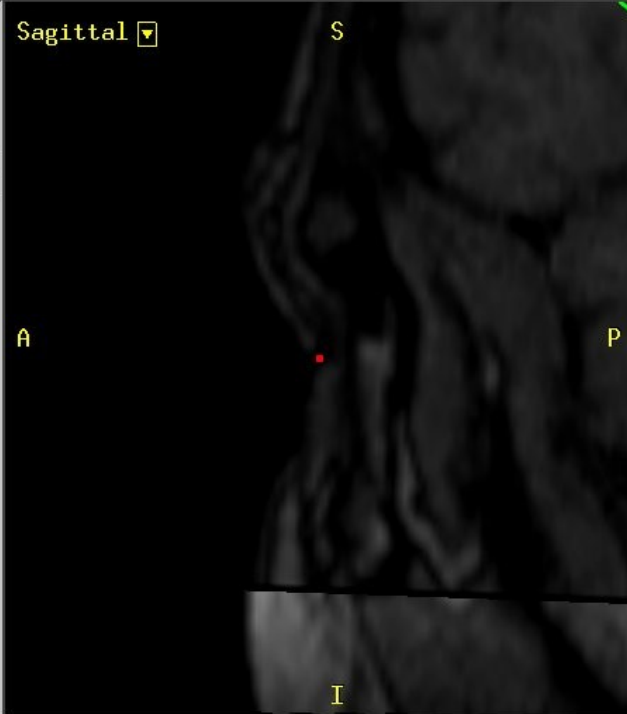
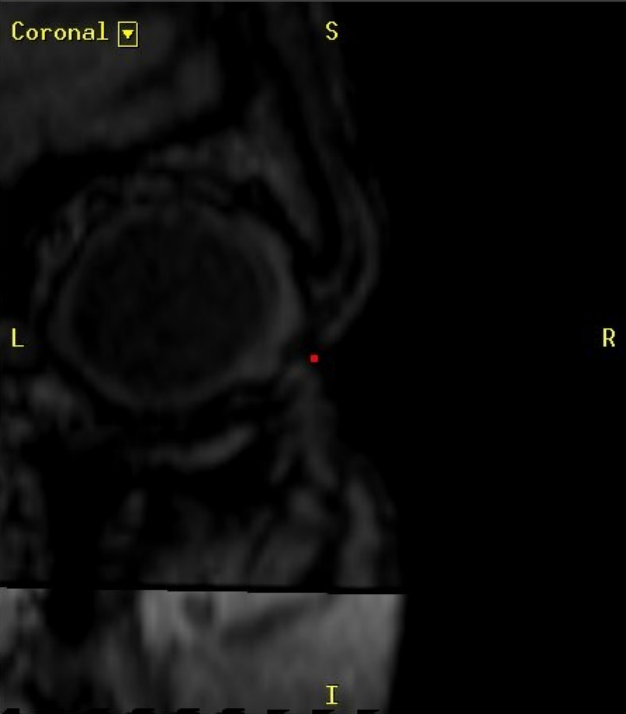
SP R3.6
SL 2.0
FoV 203*270
192*256
Sag>Cor(-3.4)
W 329
C 1/1





2. beteg

colloid cysta



Medtronic StealthStation®

Prep **Plan** Setup Nav End

Build 3D Model

Identify landmarks on images

Define Surgical Plan

Choose point on images that will be identifiable in surgery, then "Store". Repeat for a total of at least four points.

Reg. 1 Edit..

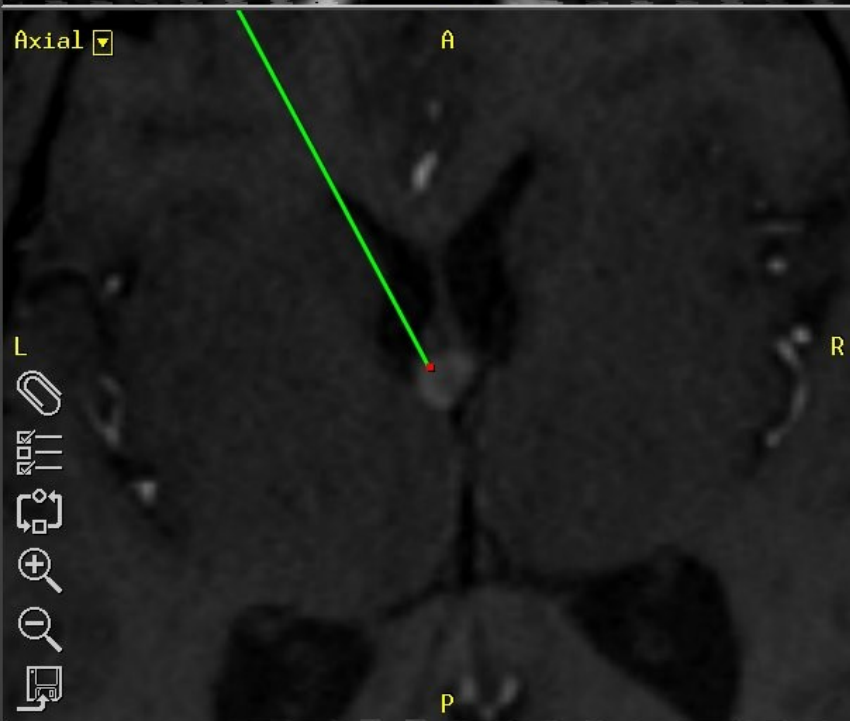
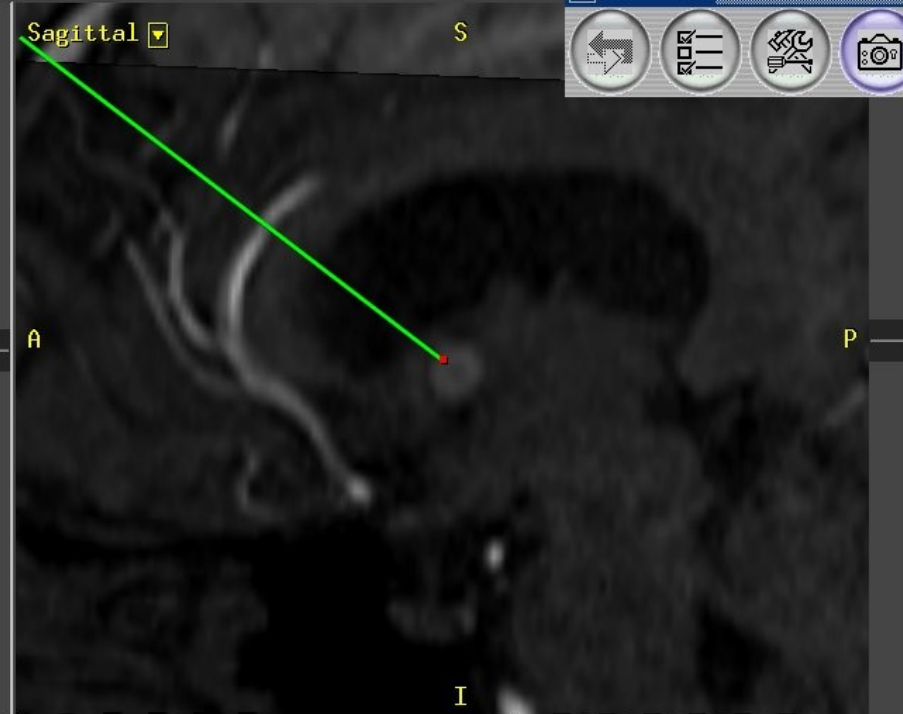
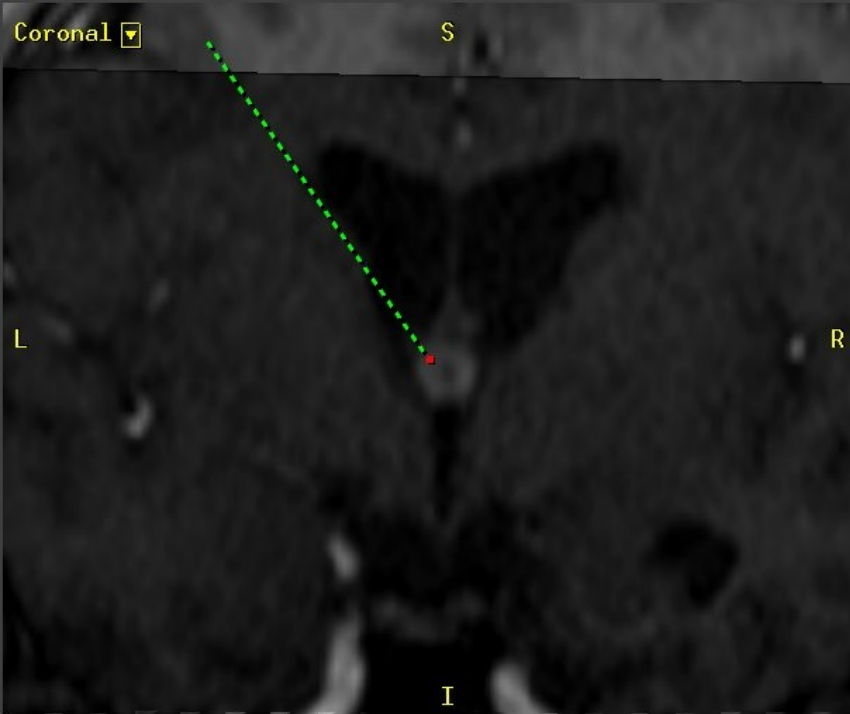
01	Stored
02	Stored
03	Stored
04	Stored
05	Stored
06	Stored
07	Stored
08	Stored
09	Stored
10	--

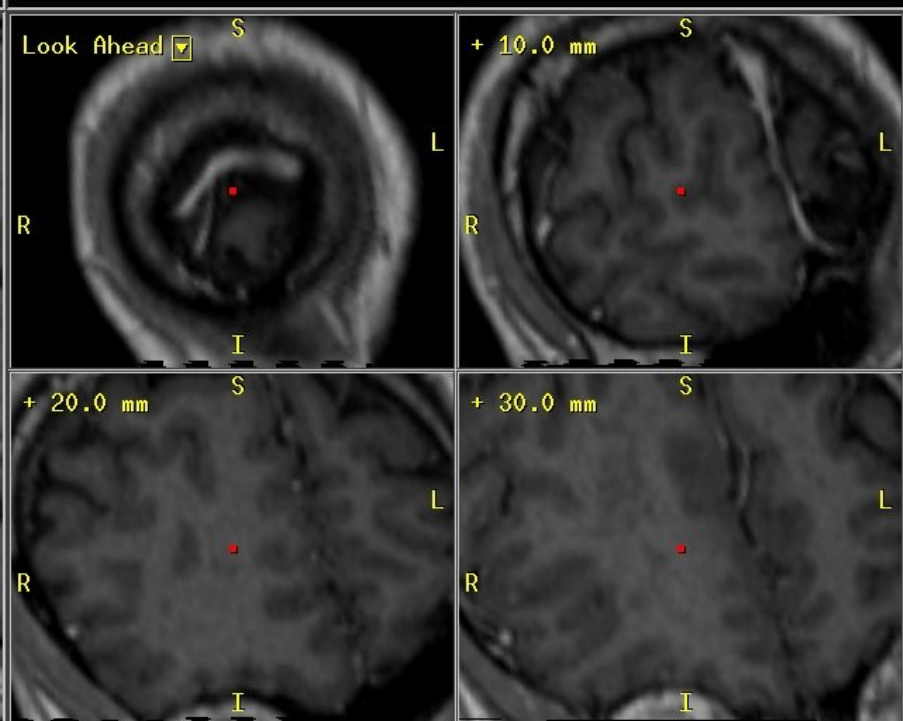
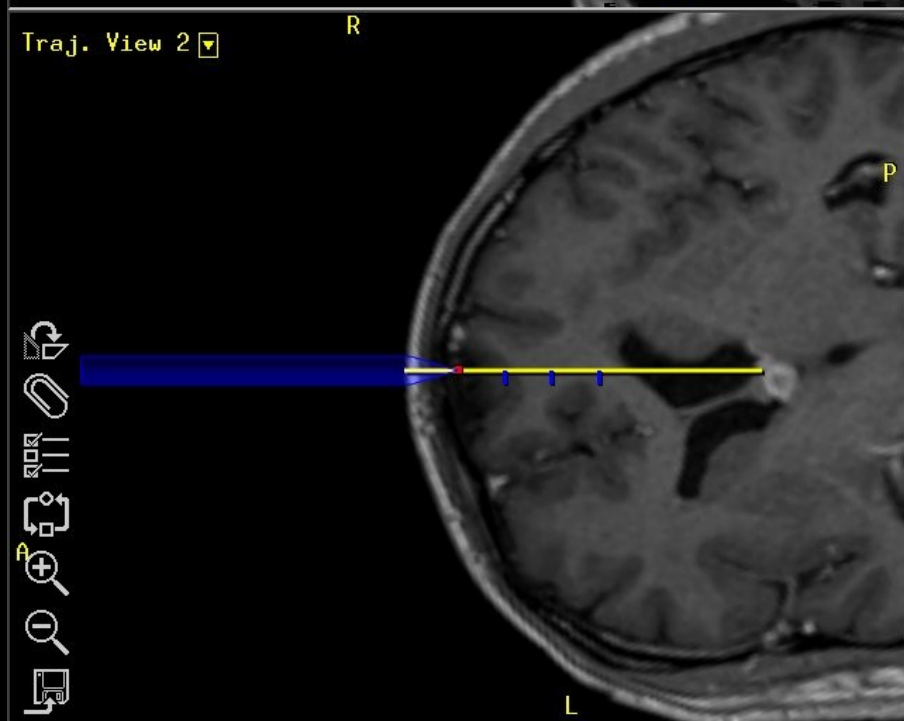
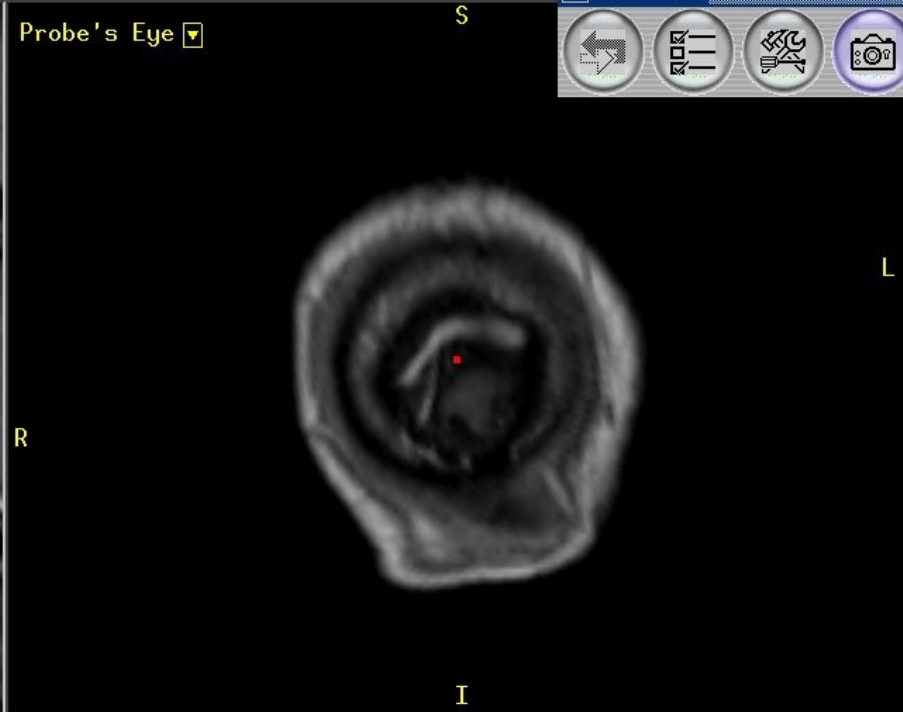
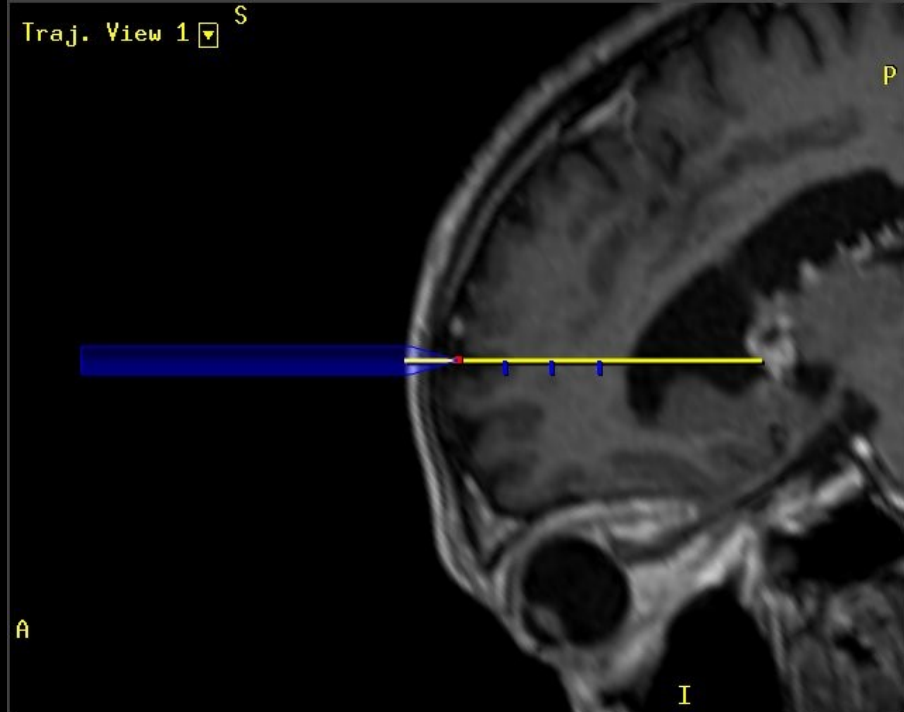
Store

Clear

Clear All

Back Next





Traj. View 1

Farkas^Zoltán

Probe's Eye

Farkas^Zoltán

Prep **Plan** Setup Nav End

- Build 3D Model
- Identify landmarks on images
- Define Surgical Plan

Choose point on images, then Set Entry or Set Target. You will be able to add/edit plans in Navigate.

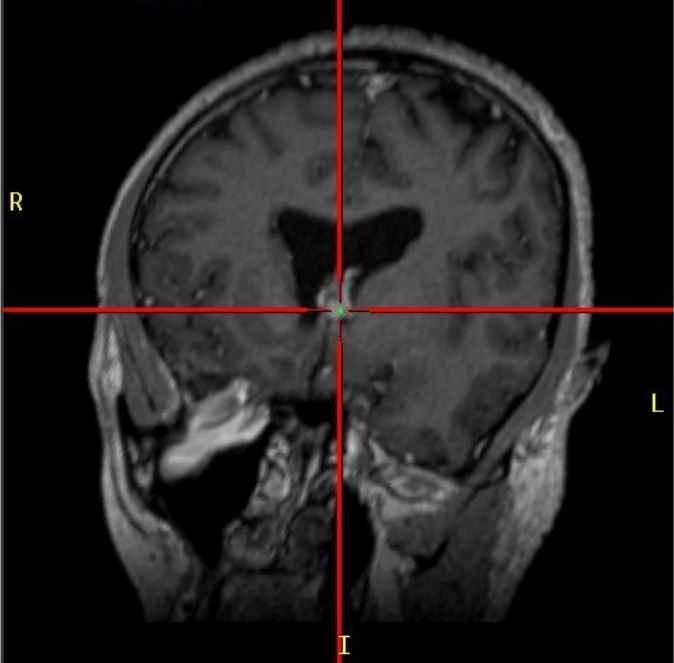
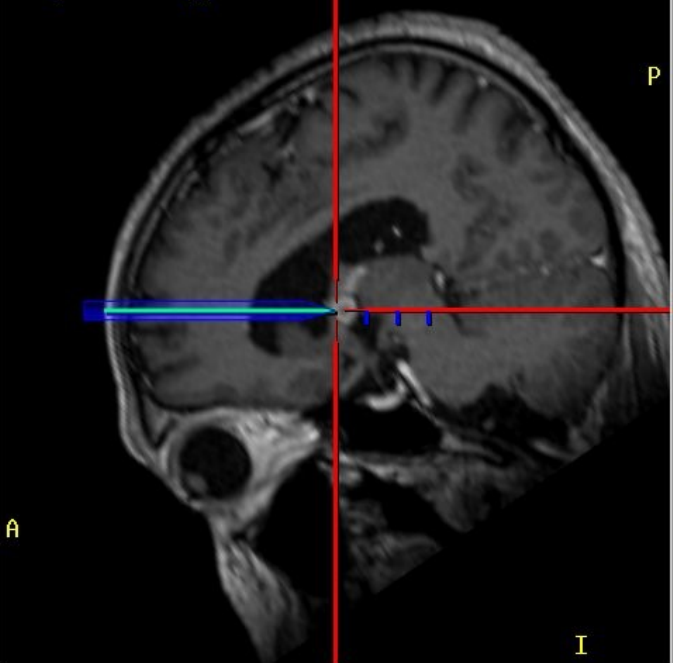
Bal Edit...

73.8

Set Entry 73.8 mm Set Target

0.0 mm past target
0.0 mm off plan

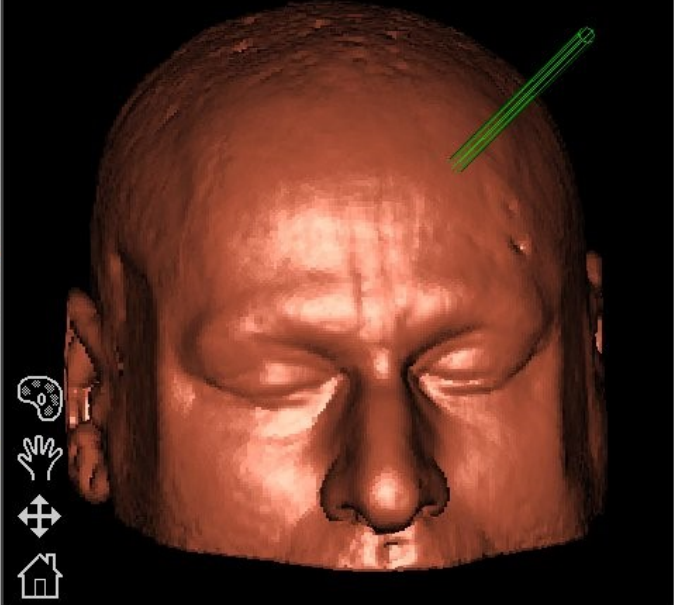
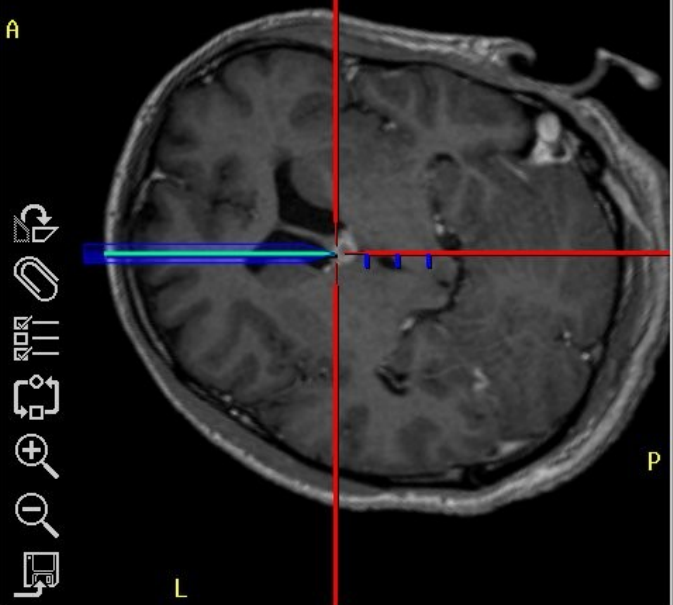
Back Next



Traj. View 2

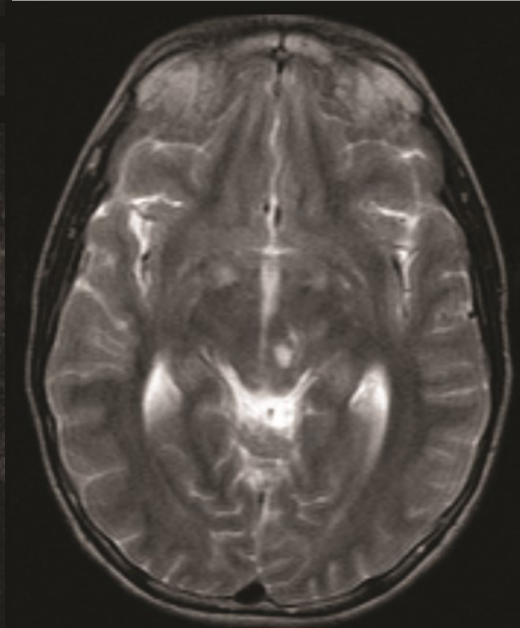
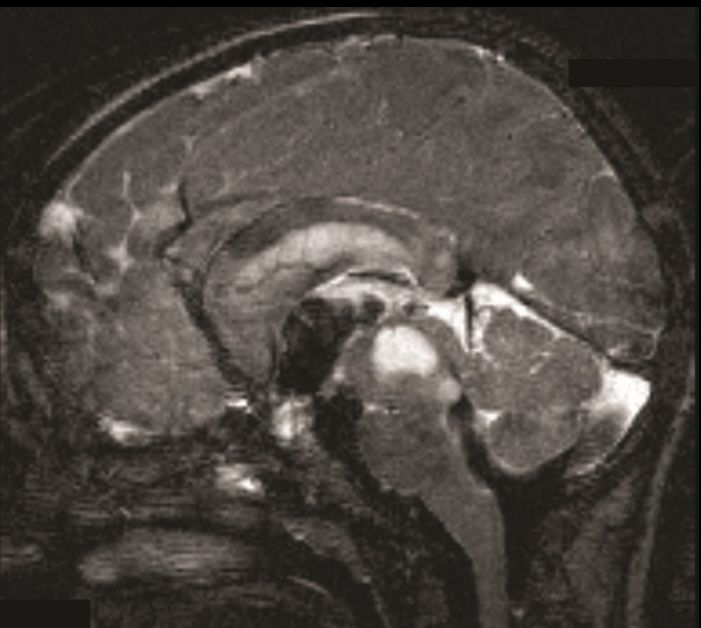
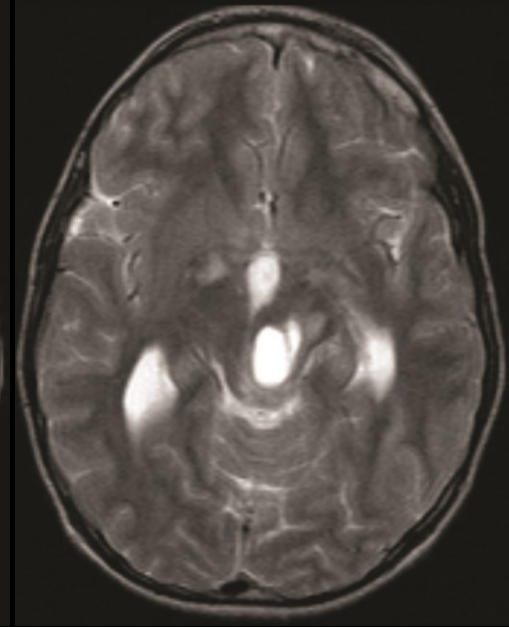
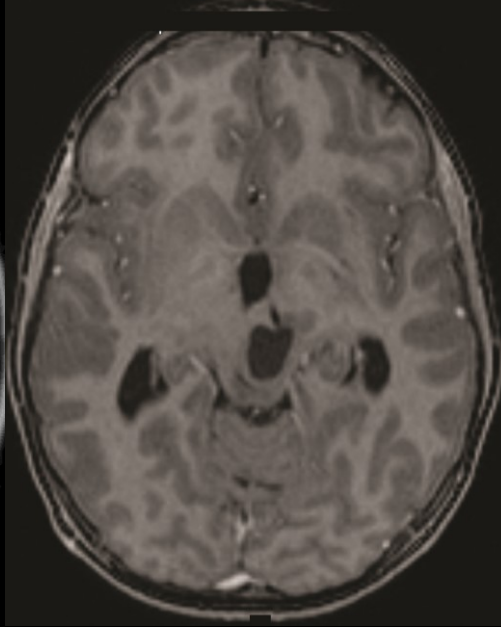
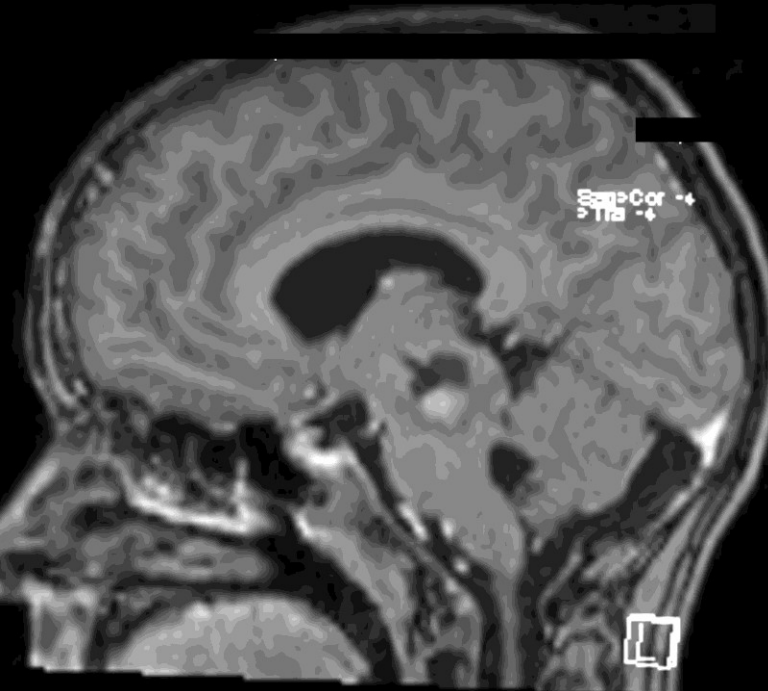
Farkas^Zoltán

3D



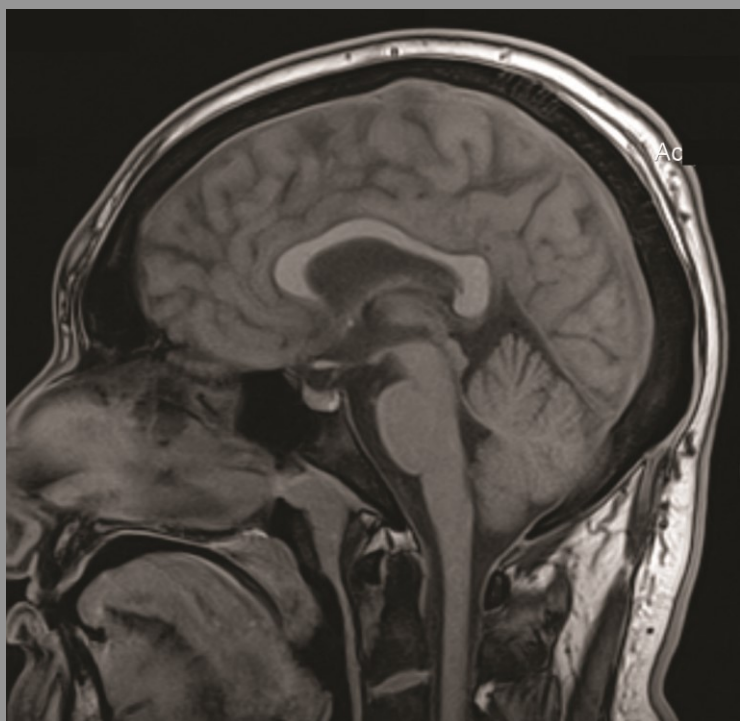
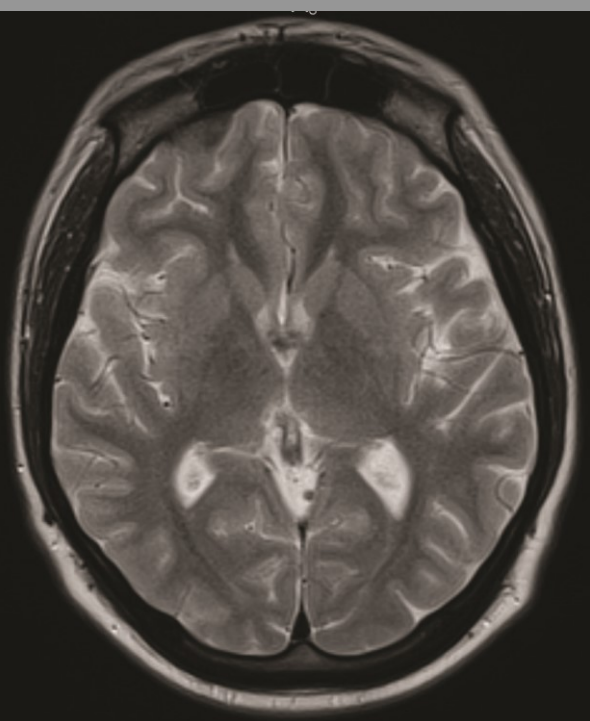
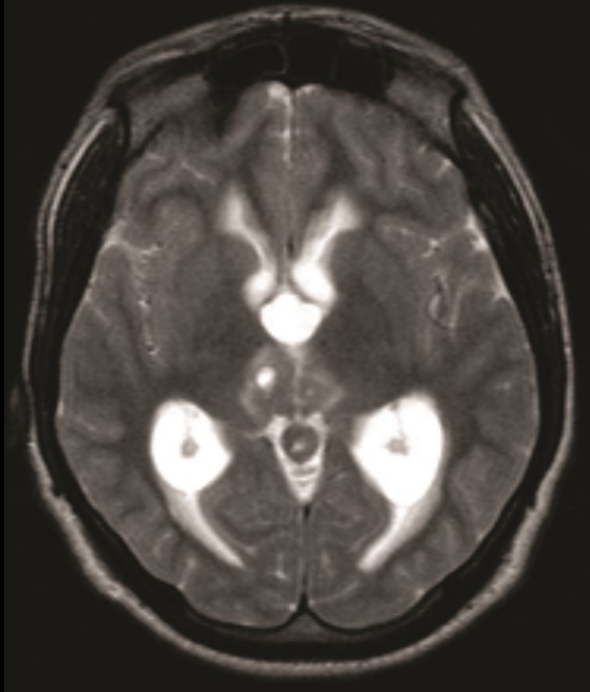
3. beteg

agytörzsi cystás glioma
(neurofibromatosis)



4. beteg

germinoma

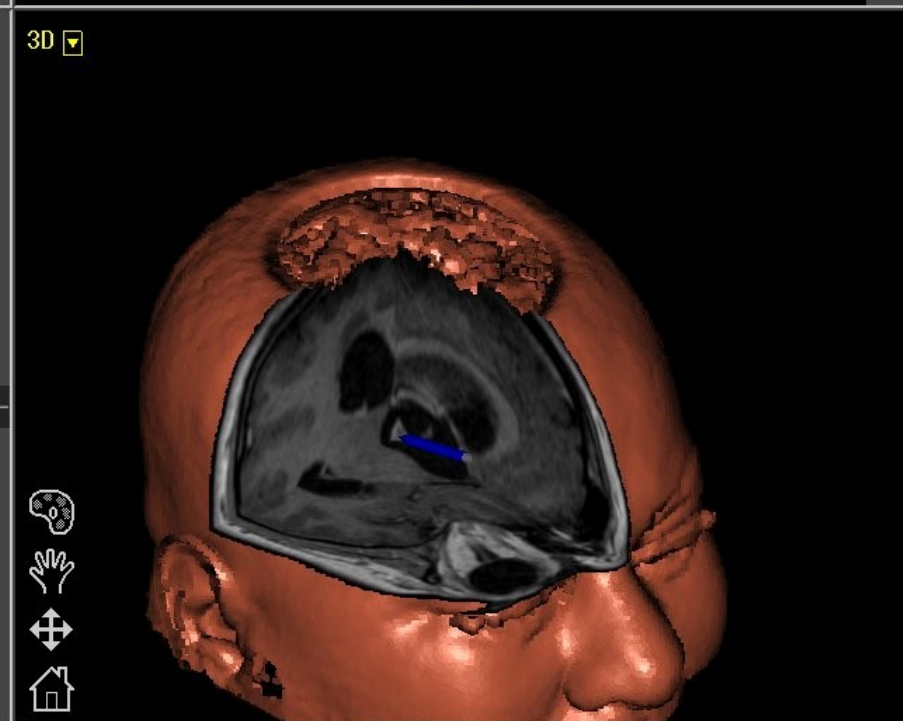
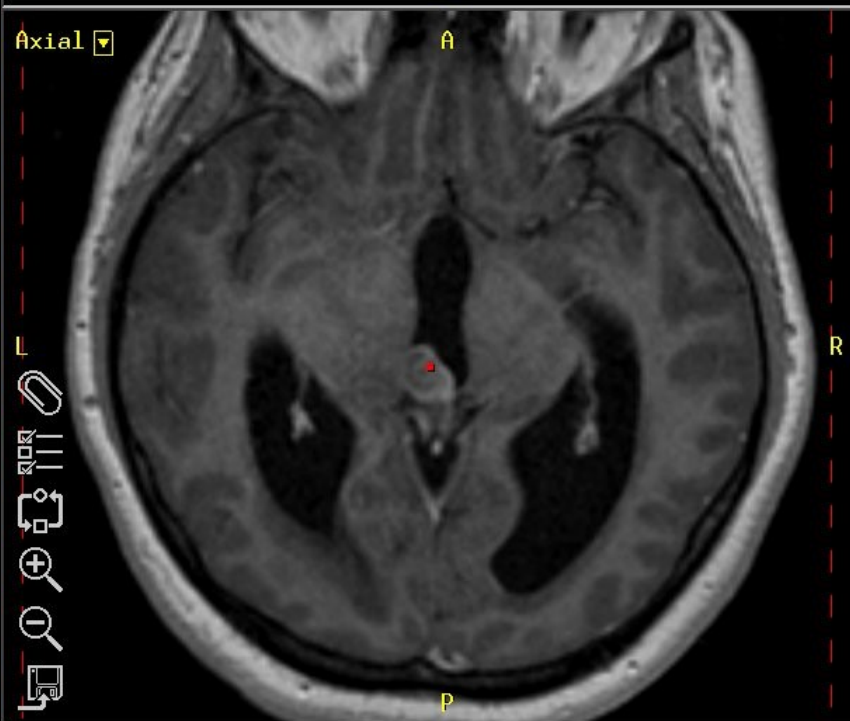
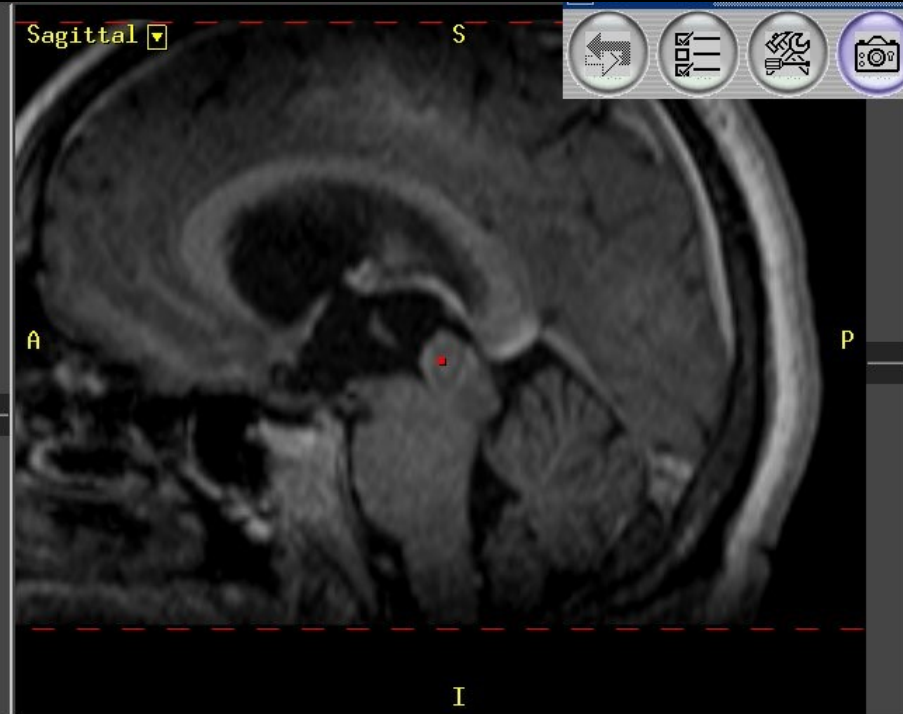
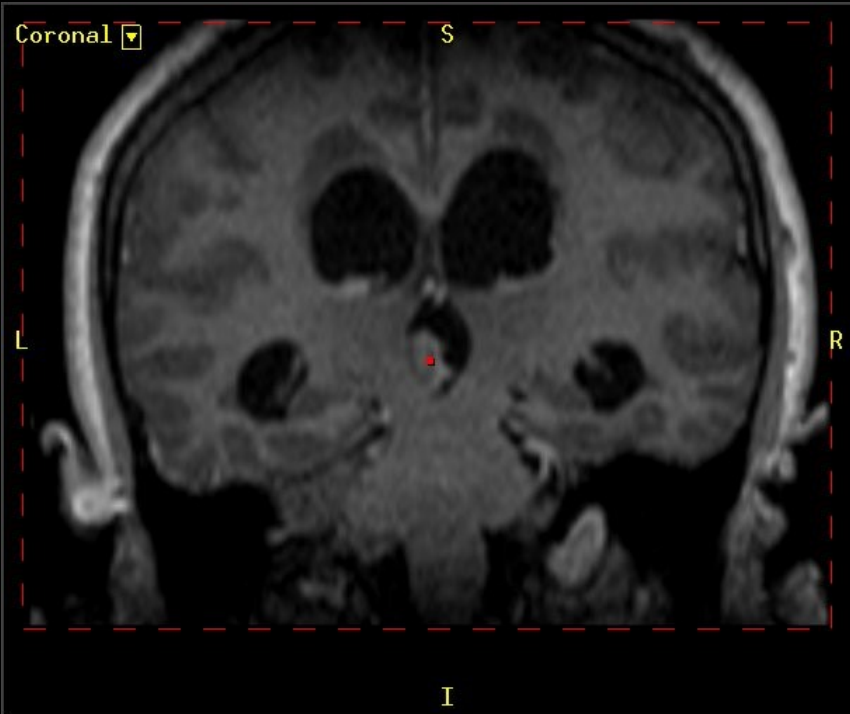


III. kamra hátsó része: biportalis

- A két cél egy szűrőcsatornából nem kereshető fel
- Biportalis behatolásból egyidőben, vagy egymást követően

5. beteg

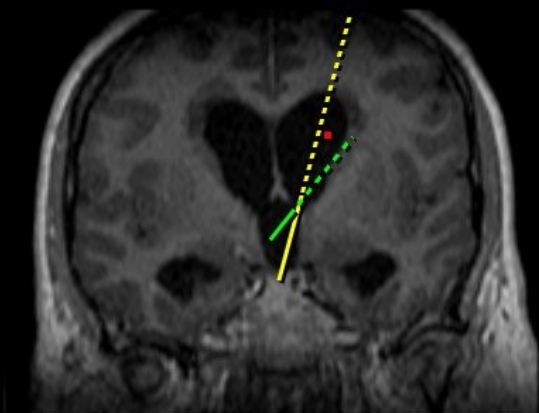
ependymoma



Coronal ▾

S

L



I

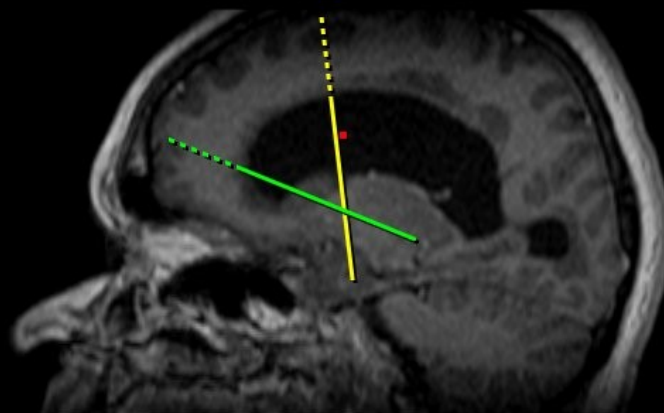
Sagittal ▾

S

R

A

P

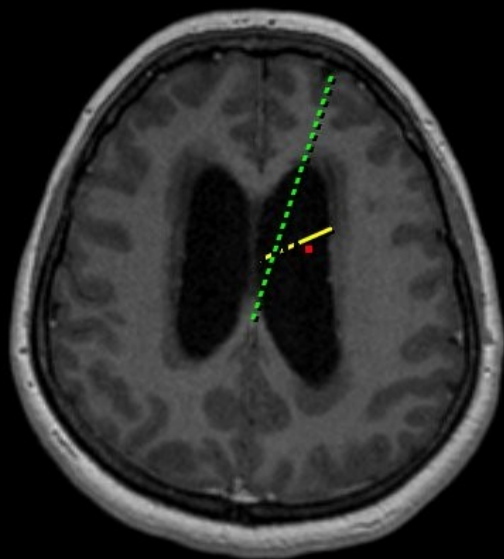


I

Axial ▾

A

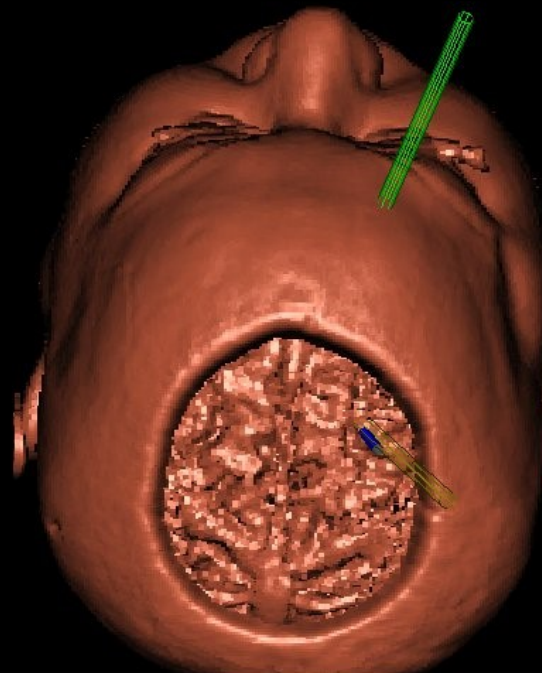
L

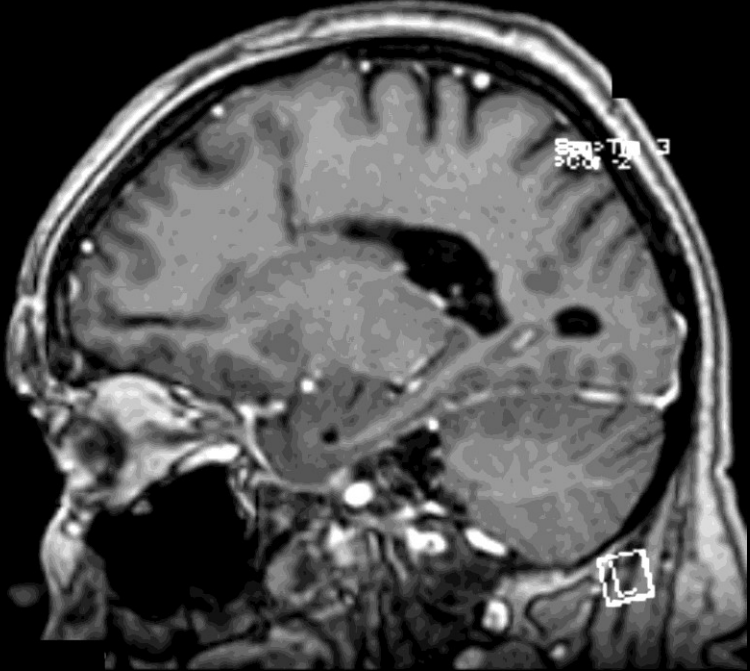
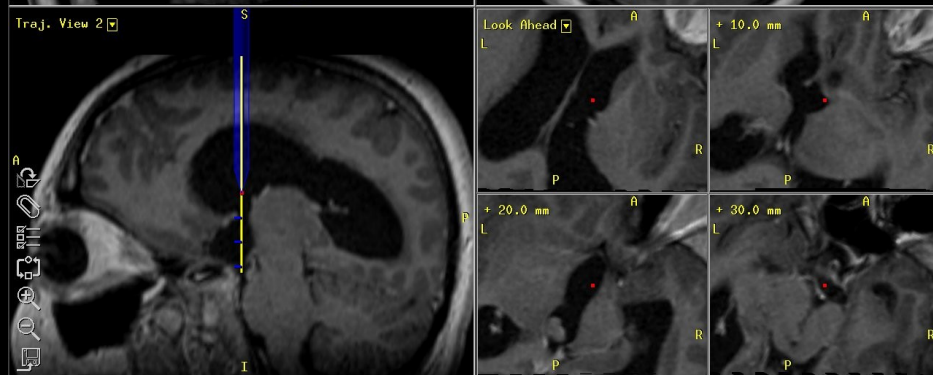
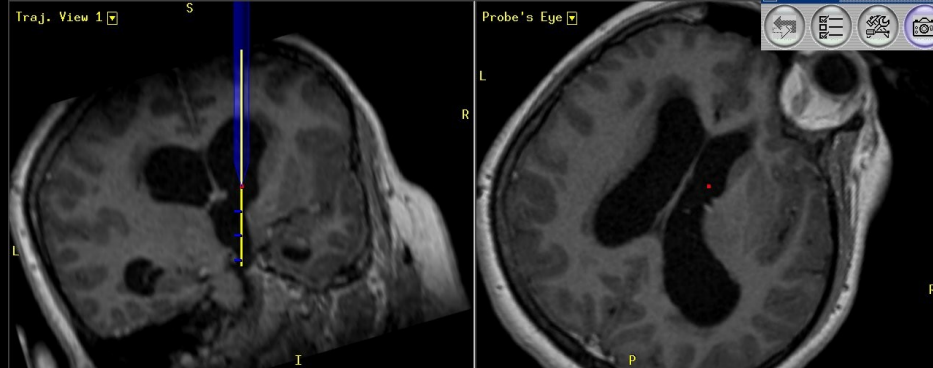
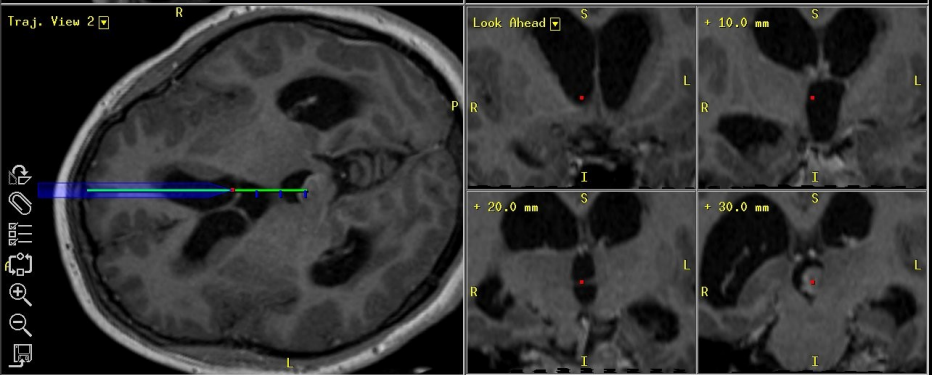
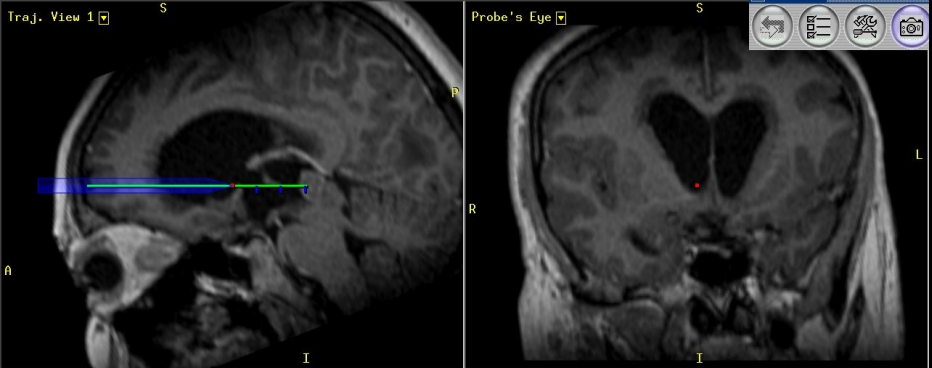


P

3D ▾

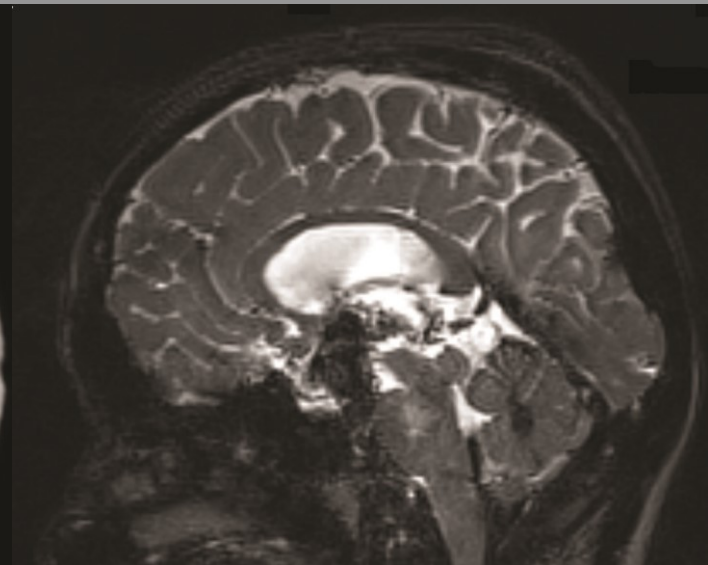
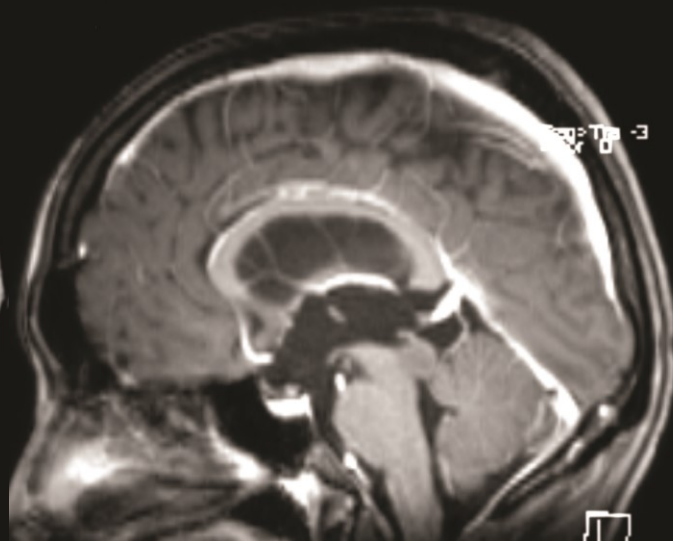
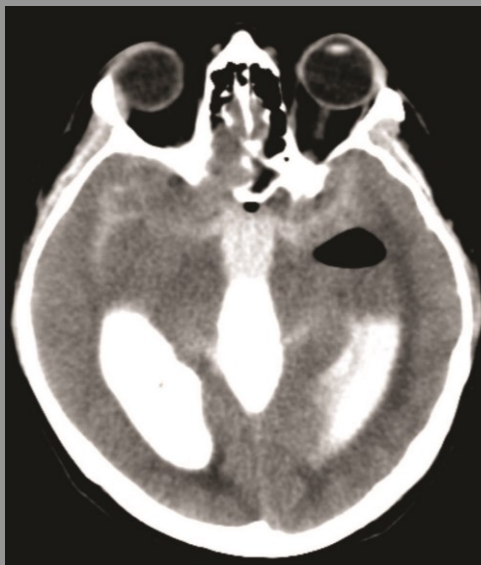
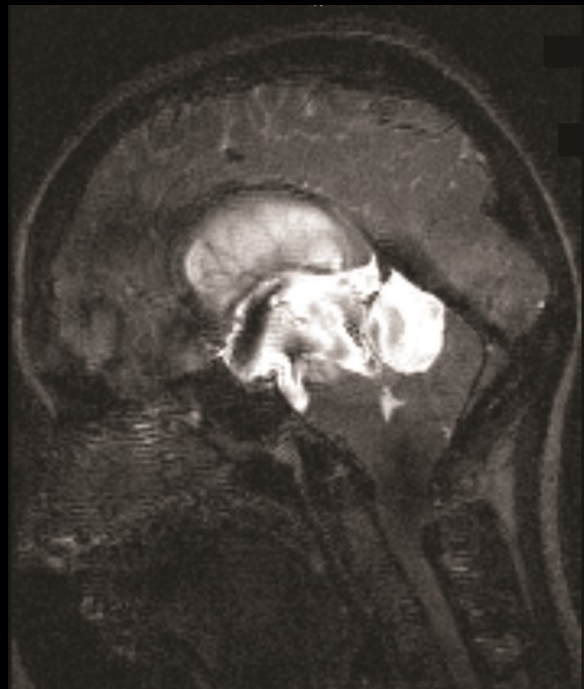
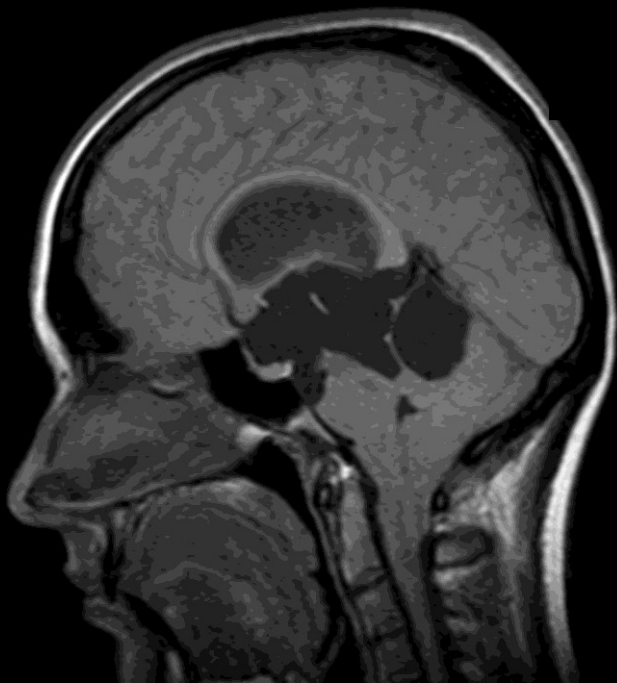
R





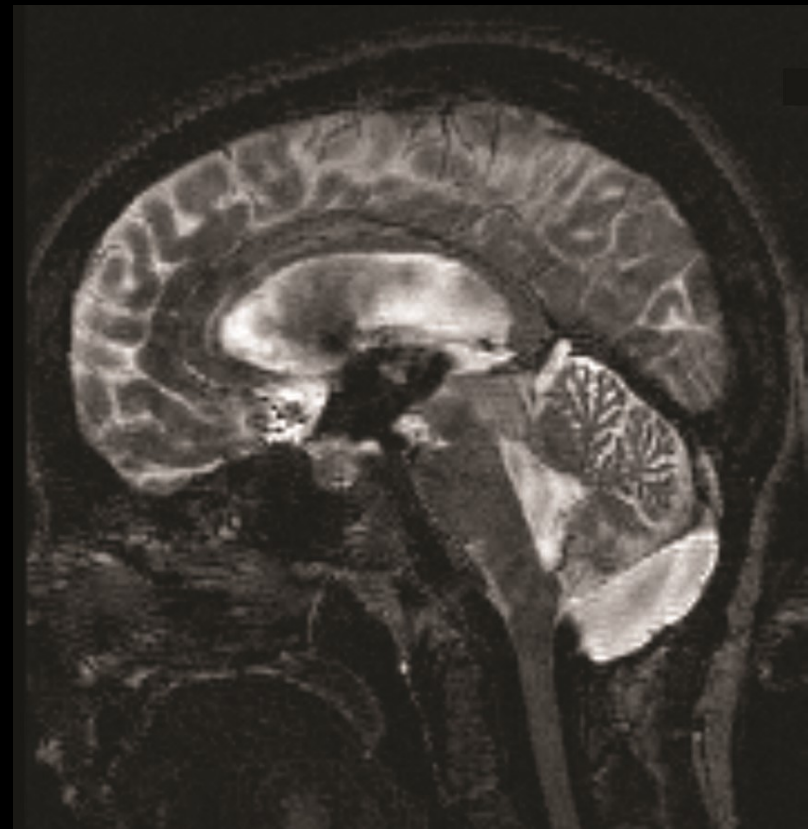
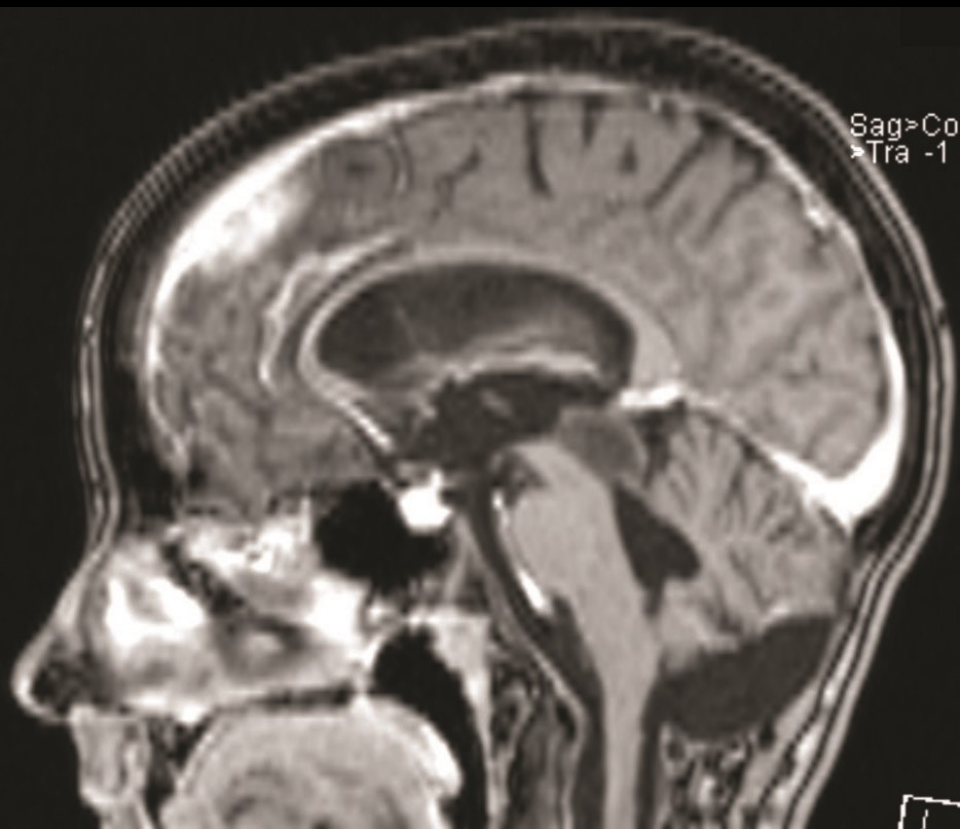
6. beteg

tectum glioma



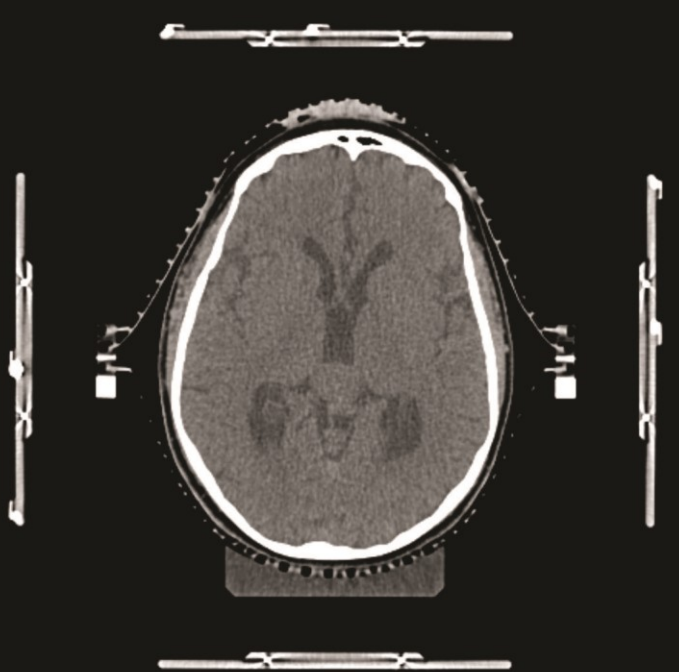
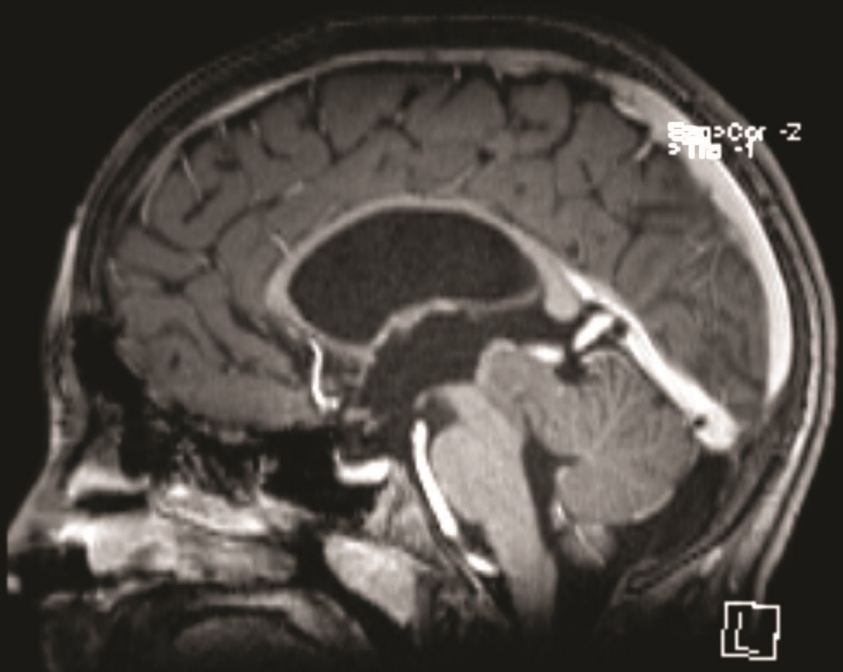
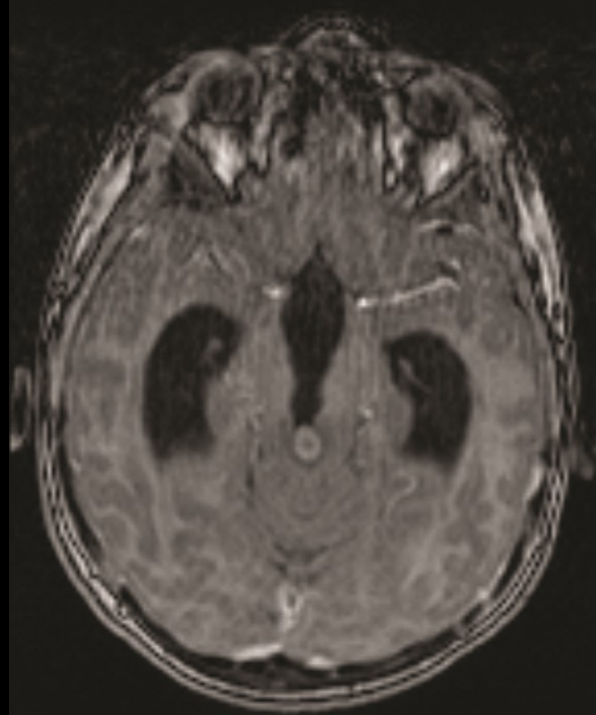
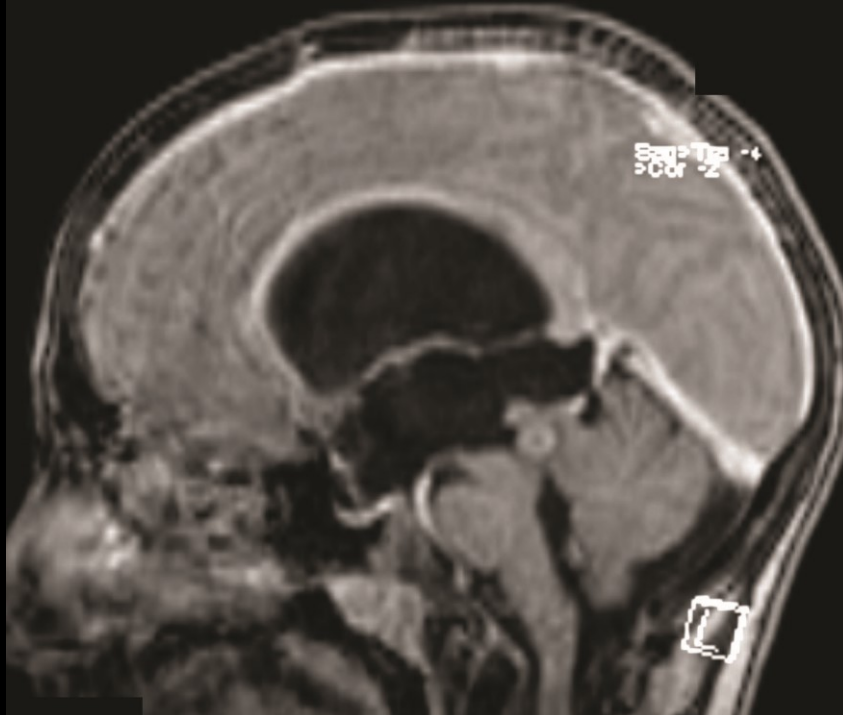
7. beteg

tectum glioma



8. beteg

tectum glioma (?)



Összefoglalás

- másodlagos occlusiv hydrocephalus esetén elsőként választandó therápiás módszer az endoszkópos ventriculostomia *gyermekkorban is*
- az egyedi anatómiai viszonyokat szem előtt tartó neuronavigatio elengedhetetlen az **optimális invazivitáshoz**