

SITU

Synnytysten ja naistentautien klinikka  
OYS



Ruoansulatuskanava

Aydin Tekay

25.5.2012 – EGO - OULU

# Esophageal atresia

|                           |                                                                                                           |
|---------------------------|-----------------------------------------------------------------------------------------------------------|
| Incidence                 | 1:2000-3000                                                                                               |
| Pathogenesis              | final relative length by 9 weeks, recanalization by week 10. Due to deviation of tracheoesophageal septum |
| Associated abnormalities  | 30-70% (CVS 28%, GIS 23%, GUS 19%, skeletal 18%)<br>Tracheoesophageal fistula (85%)                       |
| Chromosomal abnormalities | Trisomy 18                                                                                                |
| Misc.                     | IUGR (40%)                                                                                                |
| Detectable in USS         | <b>Polyhydramnion + absent / small stomach</b>                                                            |



|        | AP         | Transverse | Longitudinal |
|--------|------------|------------|--------------|
| 19-24w | 0.8-0.9 cm | 0.9-1.8 cm | 1.5-2 cm     |

Incidence: 0.4-2% Abnormal outcomes in 45-66%



010382-132F

RAB 4-8L/Obstetric

12.5cm / 37Hz

MI 1.2

OYS / NKL

14-11-2005 02:17:56 PM

Routine  
Har-low  
Pwr 100 %  
Gn 15  
C7 / M7\*  
P5 / E1

GE

Cine 498

14 sec



# Pyloric stenosis

|                           |                                                                                           |
|---------------------------|-------------------------------------------------------------------------------------------|
| Incidence                 | 1:1000000                                                                                 |
| Pathogenesis              | A failure of gastrointestinal recanalization                                              |
| Associated abnormalities  | 5% (duodenal stenosis, aortic coarctation)<br><br>Pyloric atresia (epidermolysis bullosa) |
| Chromosomal abnormalities |                                                                                           |
| Other                     |                                                                                           |
| Detectable in USS         | <b>Polyhydramnion (third trimester, 50%) + large stomach</b><br><br>22 weeks              |

Vol



E8

02.1985

RAB4-8-D/OB

MI 1.2

OYS

110285-064P

13.6cm / 1.4 / 21Hz

TIs 0.1

07.07.2011

13:53:06

SEPIA23  
Har-high  
Pwr 100 dB  
Gn -13  
C6 / M7  
P2 / E2  
SRI II 3

E8

www.tekay.fi

Voluson



280286-120R GA=31w0d

RAB4-8-D/OB

15.4cm / 1.4 / 19Hz

MI 1.2

TIs 0.2

OYS

02.03.2009

12:55:01

SEPIA23  
Har-high  
Pwr 100 dB  
Gn -14  
C6 / M7  
P2 / E2  
SRI II 3



www.tekay.fi

# Duodenal atresia

|                           |                                                                                                                                                                    |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incidence                 | 1:3000-4500                                                                                                                                                        |
| Pathogenesis              | 6 weeks, 6-8 weeks temporarily obliterated, recanalisation by week 9-10                                                                                            |
| Associated abnormalities  | <p>7% esophageal atresia</p> <p>40% intestinal malrotation</p> <p>1% hepatobiliary, pancreatic duct anomalies</p> <p>20-36% CHD</p> <p>33% vertebral anomalies</p> |
| Chromosomal abnormalities | 30% (trisomy 21)                                                                                                                                                   |
| Other                     |                                                                                                                                                                    |
| Detectable in USS         | <p><b>Polyhydramnion (50%) + enlarged stomach &amp; duodenum (double bubble)</b></p> <p>Late 2nd or early 3rd trimester</p>                                        |
| Differential Diagnosis    | Abdominal cysts with enlarged stomach                                                                                                                              |



# Duodenaalialatresia

Voluson  
E8  
MOILANEN, OUTI IRMELI 16.02.1981 RAB4-8-D/OB MI 1.2 OYS  
160281-172C 18.9cm / 1.4 / 16Hz TIs 0.1 21.04.2011 12:41:09  
SEPIA23  
Har-high  
Pwr 100 %  
Gn 4  
C8 / M7  
P2 / E2  
SRI II 3



1 D 13.92cm

Voluson  
E8  
MOILANEN, OUTI IRMELI 16.02.1981 RAB4-8-D/OB MI 0.9 OYS  
160281-172C 12.6cm / 1.3 / 18Hz TIs 0.1 21.04.2011 12:50:06  
Cardiac  
Har-high  
Pwr 92 %  
Gn 15  
C8 / M7  
P2 / E2  
SRI II 3



Voluson  
E8  
MOILANEN, OUTI IRMELI 16.02.1981 RAB4-8-D/OB MI 0.9 OYS  
160281-172C 12.6cm / 1.3 / 18Hz TIs 0.1 21.04.2011 12:49:41  
Cardiac  
Har-high  
Pwr 92 %  
Gn 15  
C8 / M7  
P2 / E2  
SRI II 3



Voluson  
E8  
MOILANEN, OUTI IRMELI 16.02.1981 RAB4-8-D/OB MI 0.7 OYS  
160281-172C 13.1cm / 1.3 / 21Hz TIs 0.1 21.04.2011 12:49:10  
Cardiac  
Har-high  
Pwr 89 %  
Gn 15  
C8 / M7  
P2 / E2  
SRI II 3



# Bowel obstruction

|                           |                                                                                                                                                                                                                                    |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incidence                 | 1:2700                                                                                                                                                                                                                             |
| Pathogenesis              | Interruption of blood supply to a segment (jejunum 50%, ileum 43%, both 7%)                                                                                                                                                        |
| Associated abnormalities  | 7% - intestinal anomalies (omphalocele, meconium peritonitis and volvulus)                                                                                                                                                         |
| Chromosomal abnormalities | -                                                                                                                                                                                                                                  |
| Other                     | Cystic fibrosis (18-36%)                                                                                                                                                                                                           |
| Detectable in USS         | <b>Internal diameter of small bowel &gt;7mm</b><br><b>Midabdominal dilatations</b><br><b>Bowel hyperperistalsis</b><br><b>Abdominal calcifications &amp; ascites (perforation!)</b><br><b>Polyhydramnios (proximal occlusions)</b> |



ST GEORGES HOSPITAL

C5-2 40R OB/General

15 Apr 99  
2:33:19 pm

Tlb 0.2 MI 1.3  
Fr #99 14.7cm

Map 3  
150dB/C3  
Persist Med  
Fr Rate Med  
2D Opt:Gen

BW Pg  
Col Pg

HDI

www.tekay.fi





Voluson E8 KOSKELA, LAURA RIITTA SUSANNA 18.0 RAB4-8-D/OB MI 1.2 OYS  
180981-036X 15.4cm / 1.4 / 19Hz Tls 0.1 16.06.2011 14:01:05

SEPIA23  
Har-high  
Pwr 100 dB  
Gn 4  
C6 / M7  
P2 / E2  
SRI II 3

RIITTA SUSANNA 18.0 RAB4-8-D/OB MI 1.2 OYS  
15.4cm / 1.4 / 19Hz Tls 0.1 16.06.2011 13:58:42

SEPIA23  
Har-high  
Pwr 100 dB  
Gn 4  
C6 / M7  
P2 / E2  
SRI II 3



# Meconium Peritonitis

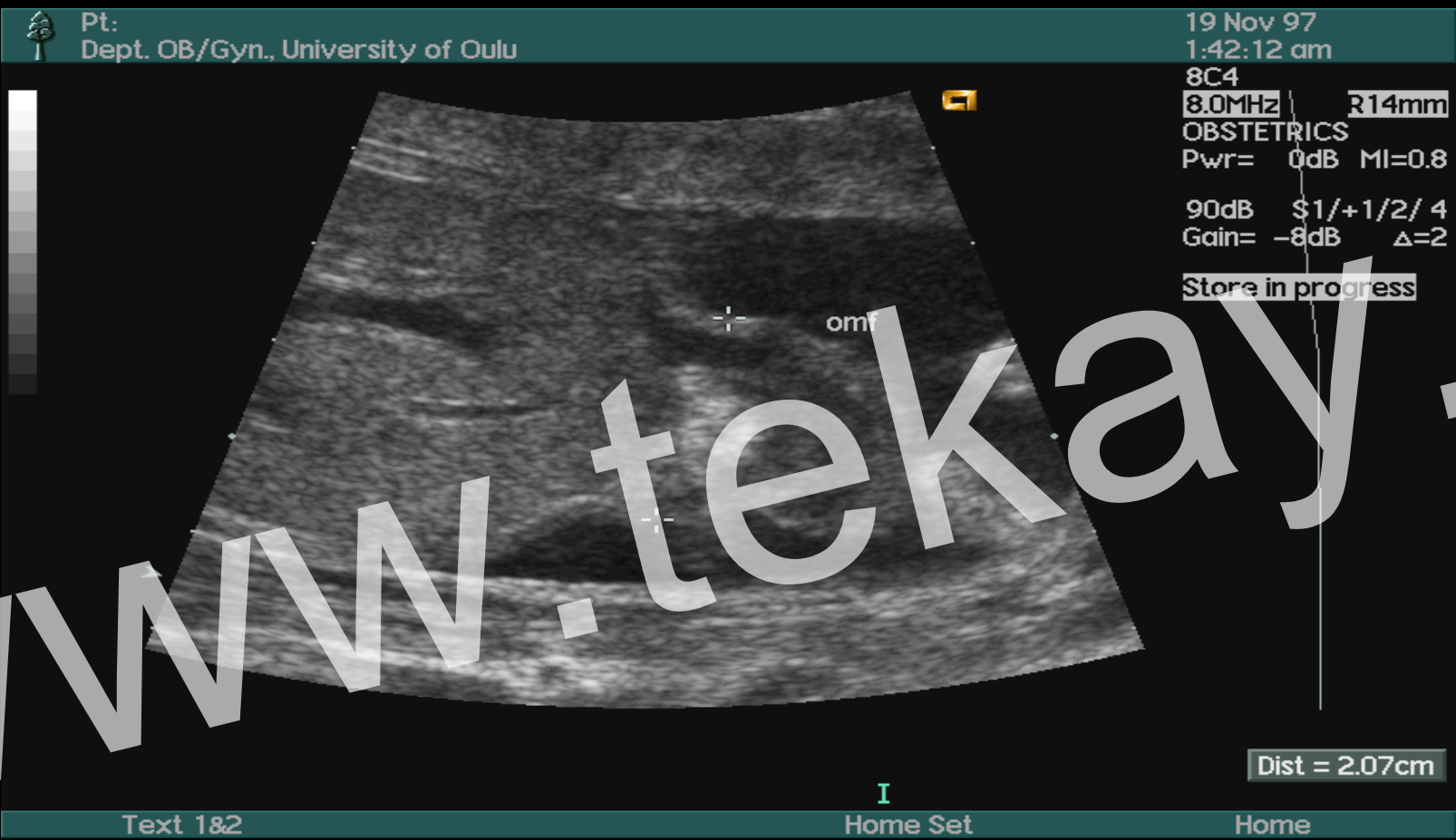
|                           |                                                                                                                                                          |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Incidence                 | 1:35000                                                                                                                                                  |
| Pathogenesis              | In utero bowel perforation => sterile chemical peritonitis                                                                                               |
| Associated abnormalities  | Bowel perforation                                                                                                                                        |
| Chromosomal abnormalities | -                                                                                                                                                        |
| Other                     | Cystic fibrosis (8-40%)                                                                                                                                  |
| Detectable in USS         | <b>Ascites + meconium pseudocyst</b><br><b>Calcifications (86%, at least 8 days after perforation)</b><br><b>Bowel dilation</b><br><b>Polyhydramnios</b> |
| Differential Diagnosis    |                                                                                                                                                          |



# Omphalocele

|                           |                                                                                                                                          |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Incidence                 | 2.5:10000                                                                                                                                |
| Pathogenesis              | Failure of bowel to return to abdomen <12 weeks                                                                                          |
| Associated abnormalities  | 50-88% CHD (VSD, TOF, PS, DORV)<br><br>CNS, GI, GU                                                                                       |
| Chromosomal abnormalities | 40-60% (trisomies 18, 13 and 21, turner)                                                                                                 |
| Other                     | Oligohydramnios/polyhydramnios 30%                                                                                                       |
| Detectable in USS         | <b>Intracorporeal liver</b> >12 weeks<br><br><b>Extracorporeal liver</b> <12 weeks<br><br><b>Cord insertion at the apex of the mass!</b> |
| Differential Diagnosis    | Gastroschisis, limb-body wall complex, amniotic band syndrome                                                                            |





06 May 03

12:13:18 pm

6C2  
H5.0MHz 100mm  
OBSTETRICS  
General  
Pwr= 0dB MI=1.6  
90dB S1/+1/2/ 4  
Gain= 6dB  $\Delta=3$

Store in progress

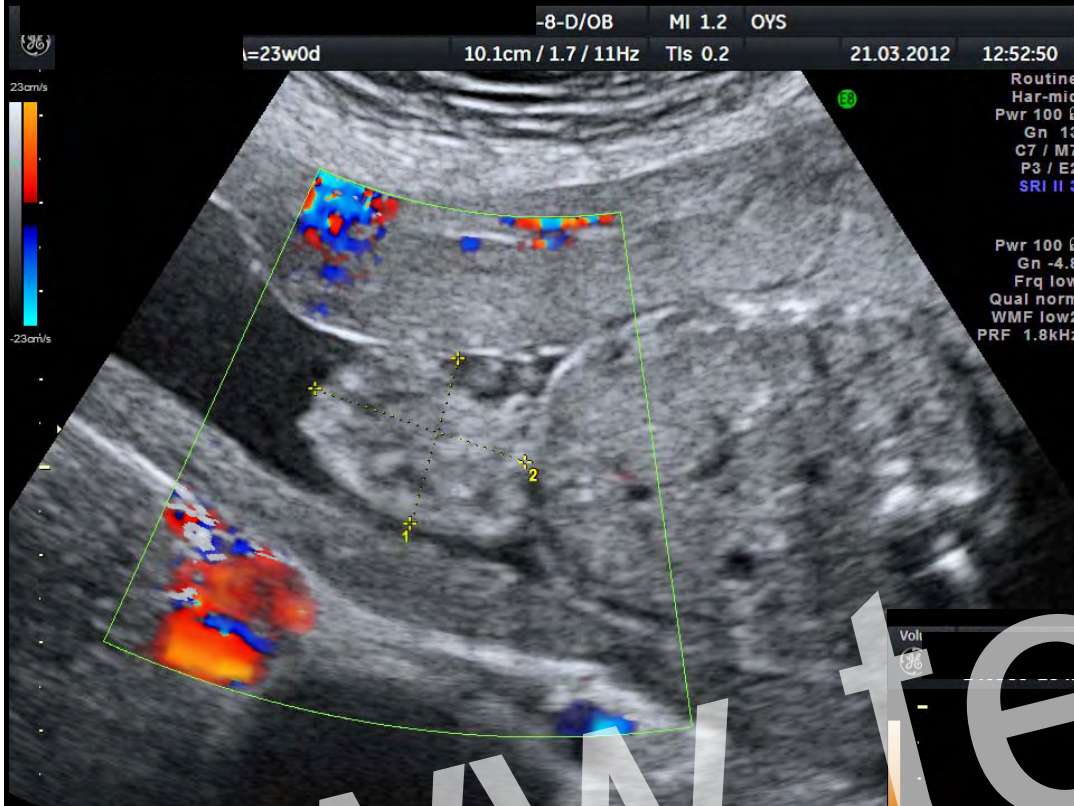
Depth = 8.38cm

Delete Set

Lock Set

# Gastroschisis

|                           |                                                                                                             |
|---------------------------|-------------------------------------------------------------------------------------------------------------|
| Incidence                 | 2.5:10000                                                                                                   |
| Pathogenesis              | Vascular insult (persistence or premature atrophy of the right umbilical vein at 6-7 weeks)                 |
| Associated abnormalities  | 7-30% (anencephaly, clefts, ASD, ectopia cordis, diaphragmatic hernia)                                      |
| Chromosomal abnormalities | -                                                                                                           |
| Other                     | Hypopertensitis and ischemic atresia of bowel, edema, dilation and bowel perforation, IUGR!                 |
| Detectable in USS         | <b>Bowel loops in amniotic cavity</b><br><br><b>(later: dilation, thickening and intraluminal meconium)</b> |
| Differential Diagnosis    | Omphalocele                                                                                                 |



1 D 1.19cm

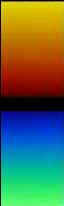




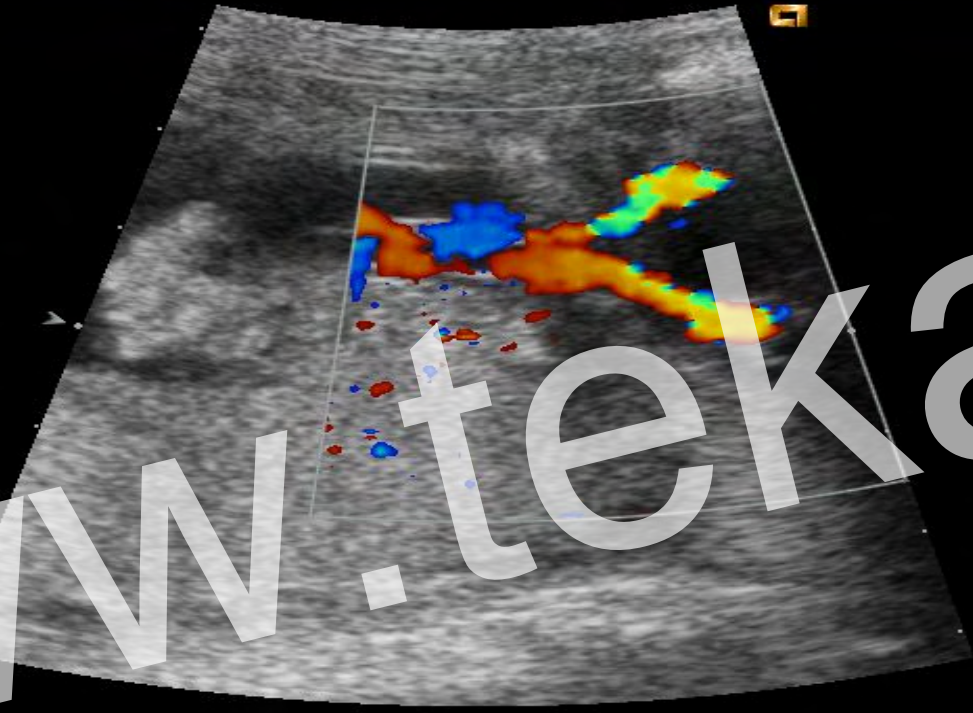
31 Mar 03

12:34:29 pm

.23



.23



6C2  
6.0MHz  
OBSTETRICS  
Fast Flow  
Pwr= -4dB  
Mlcd=1.1 TIS=0.9  
T1/-1/ 1/V:2  
2/1 CD 3.5MHz  
CD Gain = 50  
Store in progress

www.tekay.fi



ST GEORGES HOSPITAL

99/02/16:114152  
C5-2 40R OB/AT

16 Feb 99  
11:51:24 am

Tib 0.8 MI 1.2  
Fr #46 13.8cm

Map 3  
150dB/C3  
Persist Med  
Fr Rate High  
2D Opt:Res  
Col 84% Map 1  
WF Med  
PRF 2500 Hz  
Flow Opt:HRes  
BW 0 Pg 0  
Col 0 Pg 0

HDI

+ 38.4  
- 38.4  
cm/s





19 Oct 05

1:18:51 pm

6C2

6.0MHz

170mm

OBSTETRICS

General

Pwr= 0dB MI=0.7

90dB \$1/+1/2/ 4

Gain=-11dB  $\Delta=3$

Store in progress





|        |                    |         |                     |
|--------|--------------------|---------|---------------------|
|        | RAB4-8-D/OB        | MI 1.2  | OYS                 |
| =34w5d | 8.3cm / 1.1 / 46Hz | TIs 0.1 | 16.04.2012 09:24:21 |

Routine  
Har-mid  
Pwr 100 dB  
Gn 5  
C7 / M7  
P3 / E2  
SRI II 3

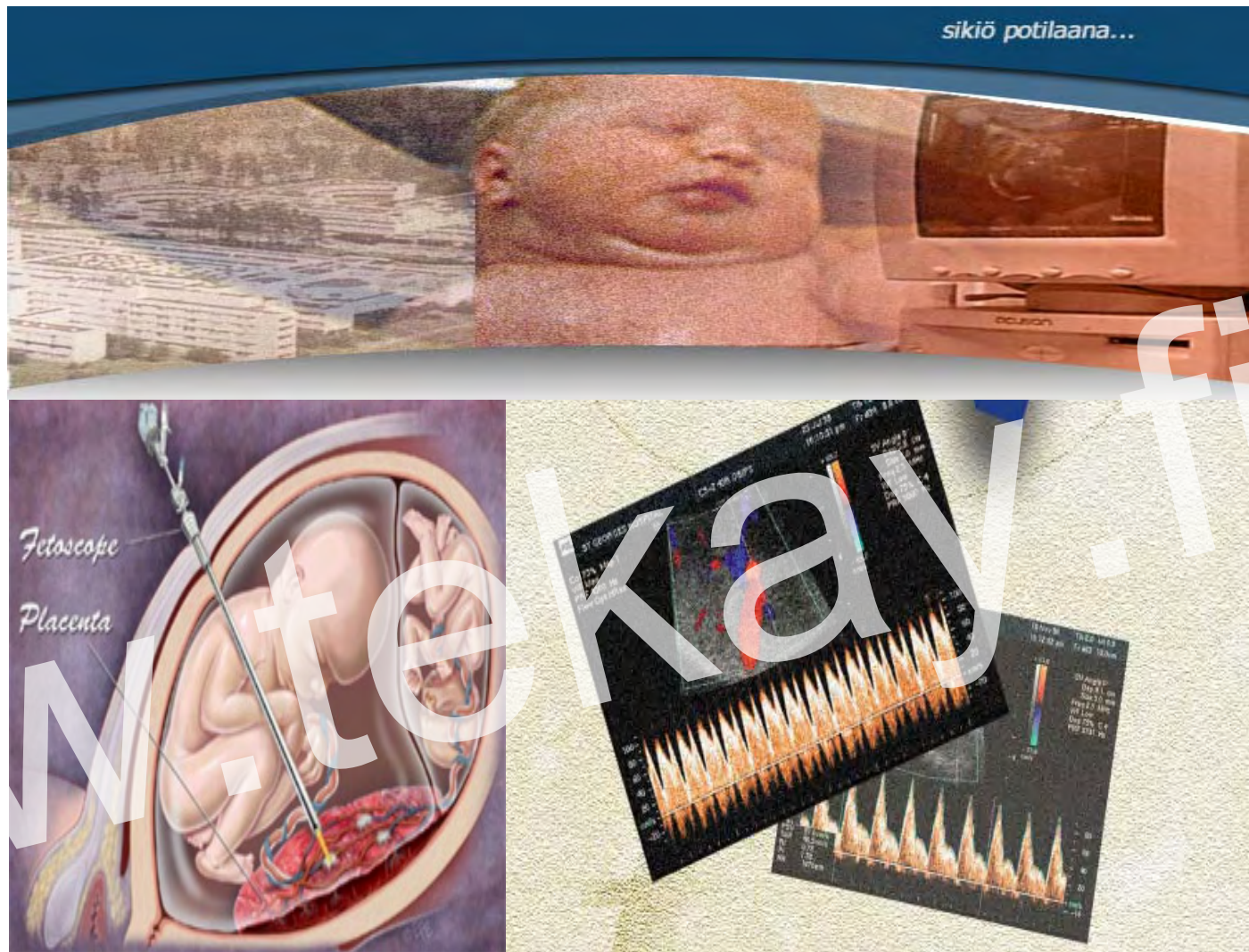


1 D 1.98cm  
2 D 1.27cm



SITU

Synnytysten ja naistentautien klinikka  
OYS



Virtsatie-elimet

Aydin Tekay

25.5.2012 – EGO - OULU

## Hydronephrotic

- Mild pyelectasis & hydronephrosis
- UPJ obstruction
- UV obstruction
- Bladder outlet
- VU reflux

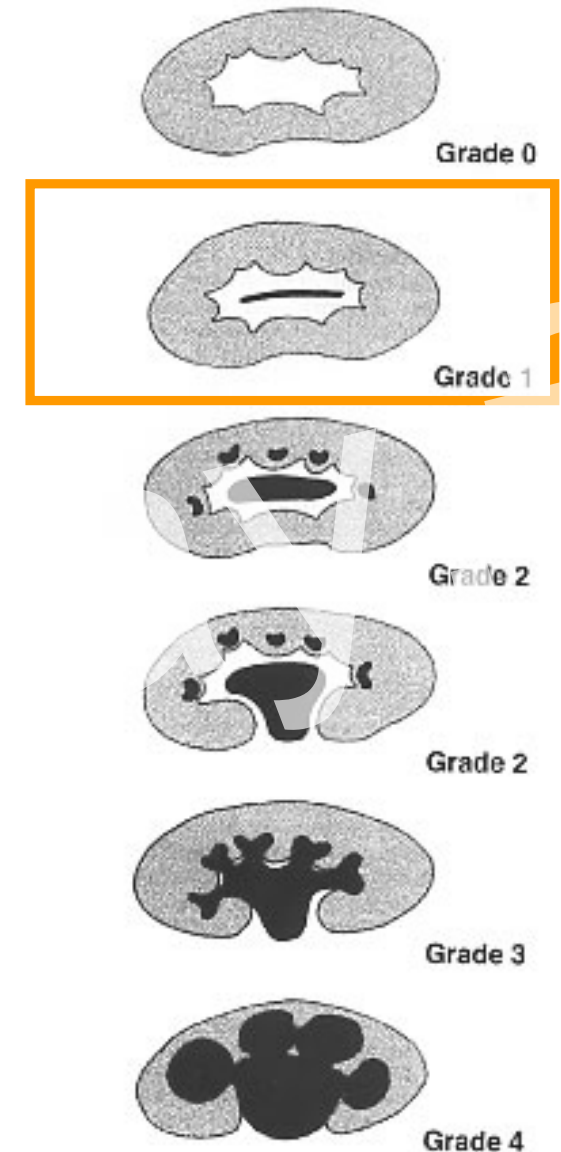
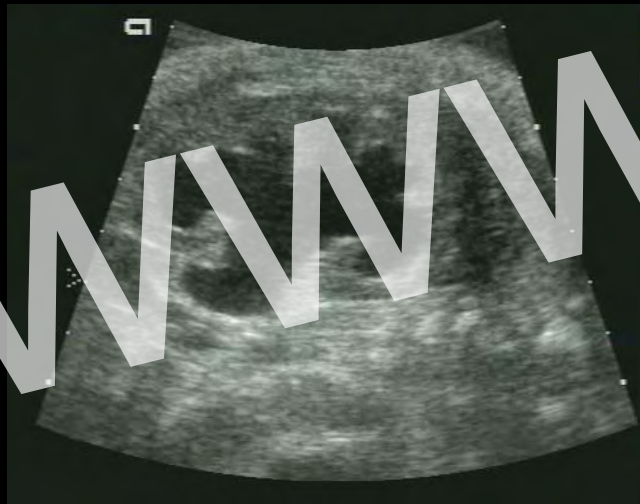
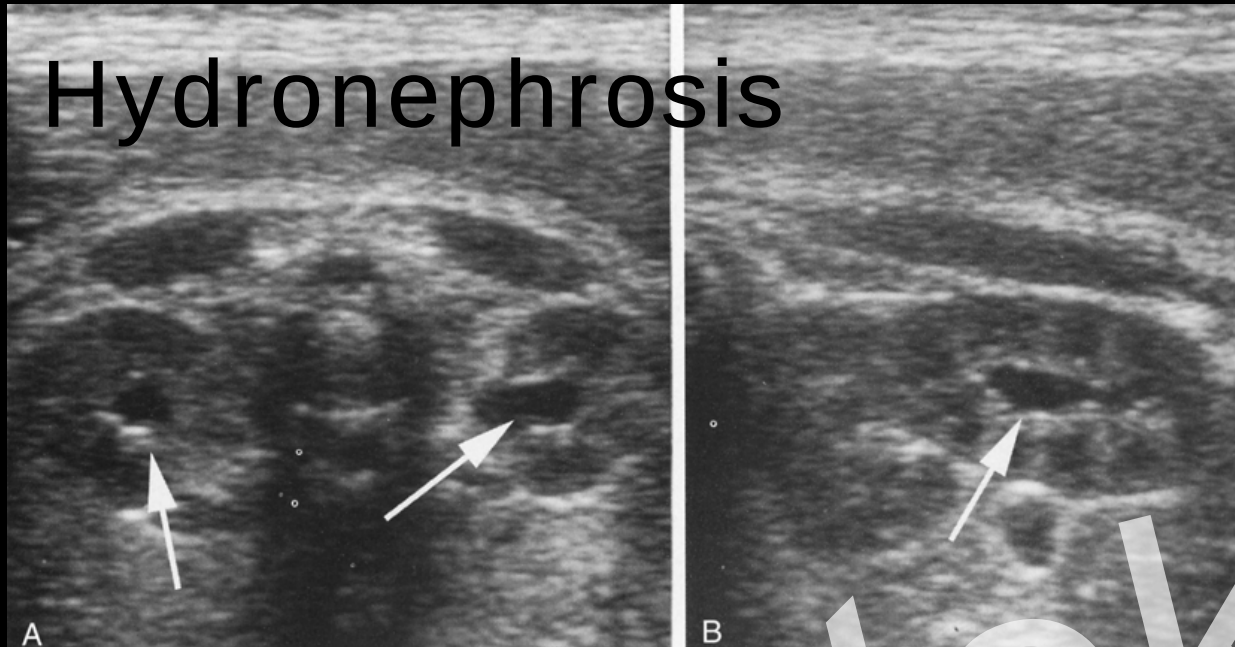
- ectopic ureterocele
- UVJ stenosis
- megaureter

## Nonhydronephrotic

- Renal agenesis
- Renal ectopy
- Renal cystic disease

- multicystic dysplastic kidney
- polycystic kidney disease  
ARPKD, ADPKD
- other

# Hydronephrosis



Grade 0: No dilation

Grade I: Pelvic dilation +/- infundibula visible – mild fetal pyelectasis (MFP)

Grade II: Pelvic dilation + calices visible

Grade III: Renal pelvis & calices dilated

Grade IV: Features of III + thin parenchyme

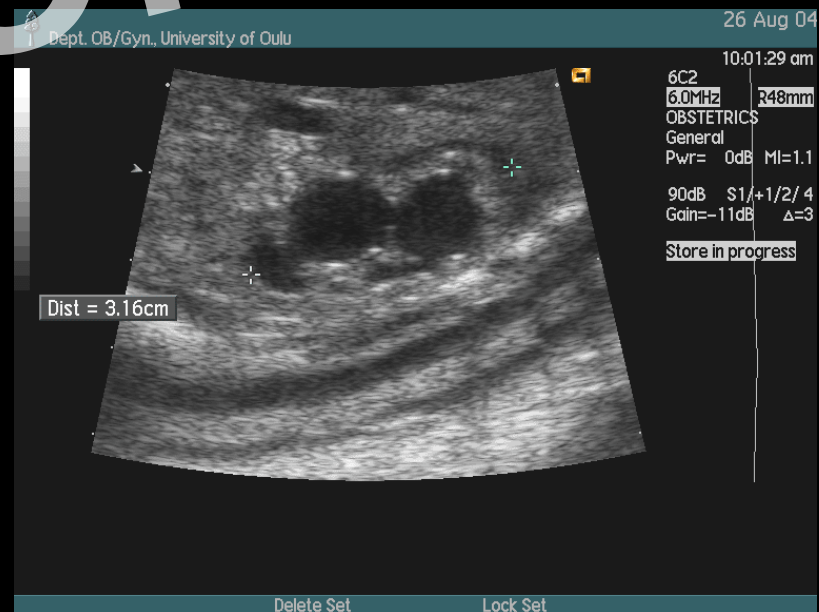


# UPJ obstruction

- **Uretero Pelvic Junction**

- Most common cause of neonatal hydronephrosis
  1. significant pelvicaliectasis (distal end blunted)
  2. no ureterectasis, ectopic ureterocele, bladder or posterior urethral dilation  
(amniotic fluid normal or polyhydramniotic)
- Progression in <50% - no need for preterm delivery!
- About 50% require surgical correction
- Often postnatal pelvic dilation less prominent (uterine environment)





# UVJ pathology

- *UreteroVesical Pathology*

1. Complete duplication with ectopic ureter
2. Congenital megaloureter
3. UVJ stenosis

Vesicoureteral reflux difficult to diff. from #2 and #3!

- ectopic ureterocele (look in the **bladder!**), occasionally dysplastic changes in upper moiety
- megaloureter mild – severe + normal bladder



# Ureterocele



Dept. OB/Gyn., University of Oulu

18 Feb 02

11:27:02 am

4V2 41Hz

H4.0MHz 342mm

OBSTETRICS

General

Pwr= 0dB MI=1.0

90dB S1/+1/2/ 4

Gain= -3dB Δ=3

Store in progress

Exit

Res Box





Dept. OB/Gyn., University of Oulu

11 Mar 02

10:09:45 am

4V2

3.5MHz

R28mm

OBSTETRICS

General

Pwr= 0dB MI=1.3

90dB S1/+1/2/ 4

Gain= -8dB Δ=3

Store in progress

Dist = 1.39cm

Dept. OB/Gyn., University of Oulu

02 Apr 02

9:45:40 am

4V2

H4.0MHz

R40mm

OBSTETRICS

General

Pwr= 0dB MI=0.9

90dB S1/+1/2/ 4

Gain= -6dB Δ=3

Store in progress

1 Dist = 4.65cm  
2 Dist = 2.93cm

Delete Set

Delete Set

Lock Set

Select Set

# Bladder outlet obstruction

Females: Urethral atresia, cloacal malformation

Males: **Posterior urethral valve (PUV)**

1. Huge bladder, thick wall, trabeculation
  2. Keyhole sign
  3. Ureters dilated (reflux) – not always!
  4. Hydronephrosis mild – moderate
  5. Occasionally paranephric urinoma, urine ascites
  6. Moderate to profound oligohydramnios
- 80% of the fetuses with oligo die. Caliectasis (better prognosis).  
**Renal dysplasia – cortical cysts and echogenicity!**



Dept. OB/Gyn., University of Oulu

01 Oct 03

1:03:31 pm

6C2

H5.0MHz

R32mm

OBSTETRCS

General

Pwr= 0dB MI=1.7

88dB S1/+1/2/4

Gain= 15dB  $\Delta=3$

Store in progress

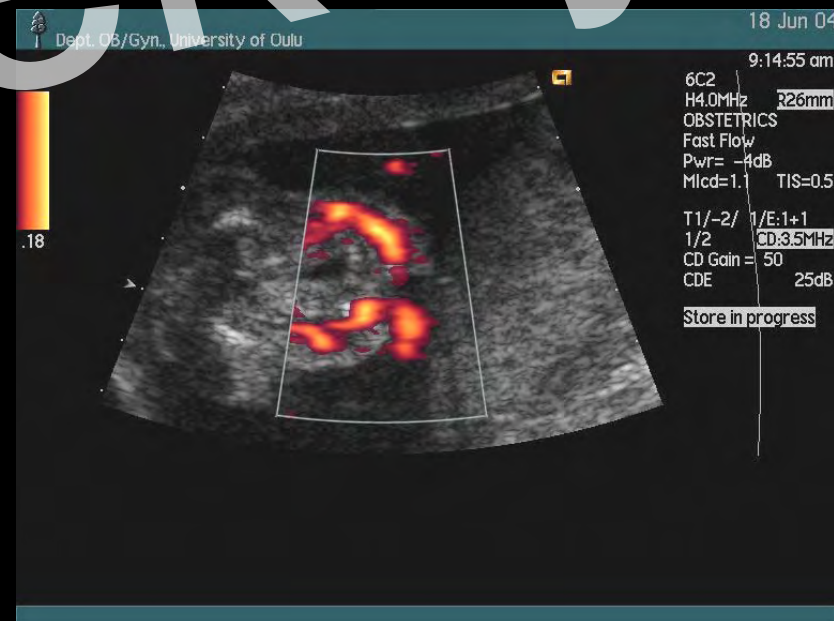


0:14:28

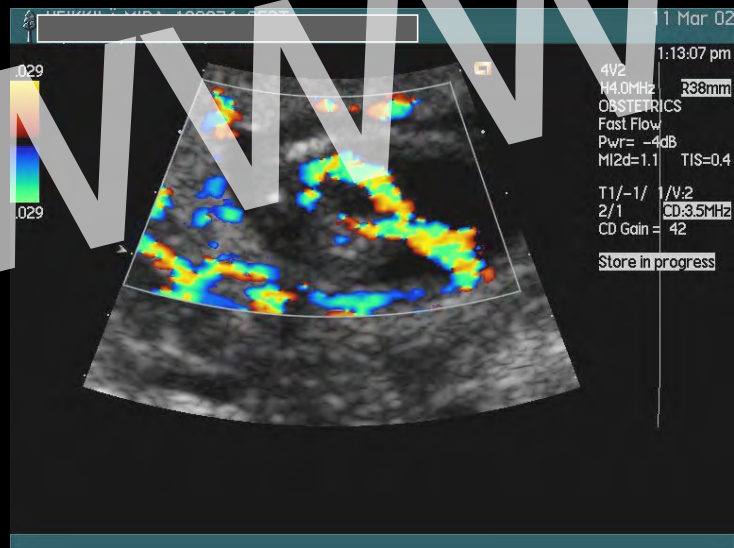












# Nonhydronephrotic

- **RENAL AGENESIS**

Severe oligohydramnios

Nonvisualised fetal bladder

Renal nonvisualisation

**Unilateral renal agenesis:** excellent prognosis unless in VACTERL complex!

- **RENAL ECTOPIA** Pelvic, horseshoe

Renal nonvisualisation

Lying down adrenal



Voluson  
E8

MI 1.1 OYS

TIs 0.1

26.03.2012

13:52:29

Routine  
Har-mid  
Pwr 100 G  
Gn 2  
C7 / M7  
P3 / E2  
SRI II 3

OIK MUN

Voluson  
E8

I 1.1 OYS

TIs 0.1

26.03.2012

13:54:32

Routine  
Har-mid  
Pwr 100 G  
Gn 2  
C7 / M7  
P3 / E2  
SRI II 3

5A=32w0d

8.3cm / 1.1 / 46Hz

TIs 0.1

26.03.2012

13:57:59

1 D 4.79cm

Routine  
Har-mid  
Pwr 100 G  
Gn 4  
C7 / M7  
P3 / E2  
SRI II 3



Dept. OB/Gyn., University of Oulu

30 Sep 03

10:29:33 am

6C2  
6.0MHz 120mm  
OBSTETRICS  
General  
Pwr= 0dB MI=1.0  
90dB S1/+1/2/4  
Gain= 3dB Δ=3

Store in progress

1 Dist = 5.55cm  
2 Dist = 2.74cm

Delete Set

Lock Set

Select Set

ECTOPIC KIDNEY

Routine  
Har-mid  
Pwr 100 Hz  
Gn 3  
C7 / M7  
P3 / E2  
SRI II 3

1 D 2.45cm  
2 D 2.21cm



Routine  
Har-mid  
Pwr 100 @  
Gn -4  
C7 / M7  
P3 / E2  
SRI II 3

E8

www.tekay.fi

11cm/s



-11cm/s

E8

Routine  
Har-mid  
Pwr 97 %  
Gn -1  
C7 / M7  
P3 / E2  
SRI II 3

Pwr 100 %  
Gn -4.8  
Frq low  
Qual norm  
WMF low2  
PRF 0.9kHz

www.tekay.fi

# Renal Cystic disease

- **Multicystic dysplastic kidney**

MCDK = Potter Type II

GROWS until nephrons die >> SHRINKS

Multiple cysts – cysts do not communicate - enlarged kidney

First trim. and early second trim. may escape detection!

Most often unilateral



Dept. OB/Gyn., University of Oulu

17 Jan 02

1:34:13 pm

4V2

H4.0MHz

80mm

OBSTETRICS

General

Pwr= 0dB MI=1.0

90dB S1/+1/2/ 4

Gain= 1dB  $\Delta=3$

Store in progress









# Renal Cystic disease

- **Polycystic renal disease**

(*autosomal recessive*: ARPKD = infantile polycystic KD)

Increased echogenicity, oligohydramnios, enlarged kidneys  
Microcysts not visible  
Diagnosis between 19-24w

- **Polycystic renal disease**

(*autosomal dominant*: ADPKD = adult type polycystic KD)

Increased echogenicity, oligohydramnios, enlarged kidneys  
Microcysts not visible  
Diagnosis between 19-24w  
One of the parents affected!





PT: PEARMAIN

9

22-JUN-99

01:08:43PM

C3\* 28HZ

8.5MHz R11%

\*OBST 2\*

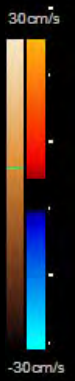
PWR = -3dB

54dB 1/2/2

GAIN = -1dB

www.tekay.fi

Volus RAB4-8-D/OB MI 1.2 OYS  
11.0cm / 1.4 / 11Hz TIs 0.2 24.10.2011 13:04:03



SEPIA23  
Har-high  
Pwr 100 dB  
Gn -2  
C6 / M7  
P2 / E2  
SRI II 3  
  
Pwr 100 dB  
Gn -5.0  
Frg low  
Qual norm  
WMF low2  
PRF 2.4kHz



Volus



RAB4-8-D/OB

MI 1.2

OYS

8.6cm / 1.4 / 21Hz

TIs 0.2

02.11.2011

13:22:06

SEPIA23

Har-high

Pwr 100 dB

Gn 4

C6 / M7

P2 / E2

SRI II 3





Volus



RAB4-8-D/OB

MI 1.2

OYS

13.6cm / 1.1 / 11Hz

TIs 0.2

09.01.2012

13:57:27

2+3 Trim.

Har-high

Pwr 100 dB

Gn -6

C6 / M7

P2 / E2

SRI II 3

SIN

1

2

1 D 8.34cm

2 D 3.57cm



Volus



RAB4-8-D/OB

MI 1.2

OYS

9.1cm / 1.4 / 21Hz

TIs 0.1

03.04.2012

09:43:23

SEPIA23  
Har-high  
Pwr 100 dB  
Gn -5  
C6 / M7  
P2 / E2  
SRI II 3

EB



1 D 0.71cm

Volus



RAB4-8-D/OB

MI 1.2

OYS

8.9cm / 1.4 / 21Hz

TIs 0.1

03.04.2012

09:53:28

SEPIA23  
Har-high  
Pwr 100 dB  
Gn -8  
C6 / M7  
P2 / E2  
SRI II 3

E8

1 D 0.62cm



Voluson E8 RAB4-8-D/OB MI 1.2 OYS  
15.4cm / 1.6 / 15Hz TIs 0.1 16.05.2012 11:39:10

2+3 Trim.  
Har-high  
Pwr 100 W  
Gn 15  
C6 / M7  
P2 / E2  
SRI II 3

1 D 6.23cm

Voluson E8 RAB4-8-D/OB MI 1.2 OYS  
11.8cm / 1.9 / 18Hz TIs 0.1 16.05.2012 11:43:34

2+3 Trim.  
Har-high  
Pwr 100 W  
Gn 15  
C6 / M7  
P2 / E2  
SRI II 3

1 D 0.63cm  
2 D 0.39cm

# OTHER

- Ovarian cysts
- Abnormal genitalia
- Neoplasms





Dept. OB/Gyn., University of Oulu

14 May 02

9:51:48 am



$\Delta \bar{V} = 0.00 \text{ m/s}$   
Dist = 3.19 cm

OV KYSTA ?

RAKKO

4V2  
H4.0MHz R54mm  
OBSTETRICS  
Fast Flow  
Pwr= -4dB  
MI2d=1.0 TIS=0.4  
T1/-1/ 1/V:2  
2/1 CD:3.5MHz  
CD Gain = 50

Store in progress

I

Text 1&2

Home Set

Home



ST GEORGES HOSPITAL

98/08/04:102908  
C5-2 40R OB/PS

04 Aug 98  
3:55:48 pm

Tib 0.2 MI 1.1  
Fr #94 13.8cm

Map 3  
150dB/C3  
Persist Med  
Fr Rate Med  
2D Opt:Res  
BW 0 Pg 0  
Col 0 Pg 0

HDI



Dept. OB/Gyn., University of Oulu

14 Apr

9:31:55

6C2  
H5.0MHz R42  
OBSTETRICS  
General  
Pwr= 0dB MI=  
87dB S1/+1/2  
Gain= 1dB  
Store in progres

Dept. OB/Gyn., University of Oulu

21 Mar 02

2:19:00 pm

4V2  
H4.0MHz 140mm  
OBSTETRICS  
General  
Pwr= 0dB MI=1.1  
90dB S1/+1/2/ 4  
Gain= 4dB  $\Delta=3$   
Store in progress



# Urogenitaalikysta

Volus  
160592-108K GA=26w4d  
RAB4-8-D/OB MI 1.2 OYS  
11.8cm / 1.9 / 37Hz TIs 0.1  
20.03.2012 10:29:48

Routine  
Har-mid  
Pwr 100 dB  
Gn 6  
C7 / M7  
P3 / E2  
SRI II 3

1 D 1.35cm  
2 D 1.30cm



# Lisämunaisverenvuoto

Voluson 5 RAB4-8-D/OB MI 1.2 OYS  
030185-1406 8.5cm / 1.4 / 26Hz Tls 0.1 30.03.2011 10:11:11

SEPIA23  
Har-high  
Pwr 100 dB  
Gn -4  
C6 / M7  
P2 / E2  
SRI II 3

1 D 3.55cm  
2 D 4.07cm

# Lisämunaisverenvuoto





Voluson  
E8

.1982

RAB4-8-D/OB

MI 1.2

OYS

B GA=29w0d

11.8cm / 1.6 / 18Hz

TIs 0.1

09.05.2012

13:26:59

2+3 Trim.  
Har-high  
Pwr 100 dB  
Gn -11  
C6 / M7  
P2 / E2  
SRI II 3



1 D 2.77cm  
2 D 1.92cm

Voluson



82

RAB4-8-D/OB

MI 1.2

OYS

GA=29w0d

15.4cm / 1.6 / 15Hz

TIs 0.1

09.05.2012

13:18:18

2+3 Trim.  
Har-high  
Pwr 100 dB  
Gn 0  
C6 / M7  
P2 / E2  
SRI II 3

E8



1 D 2.99cm