

Prenatal management of Lower Urinary Tract Obstruction



Nicola Persico

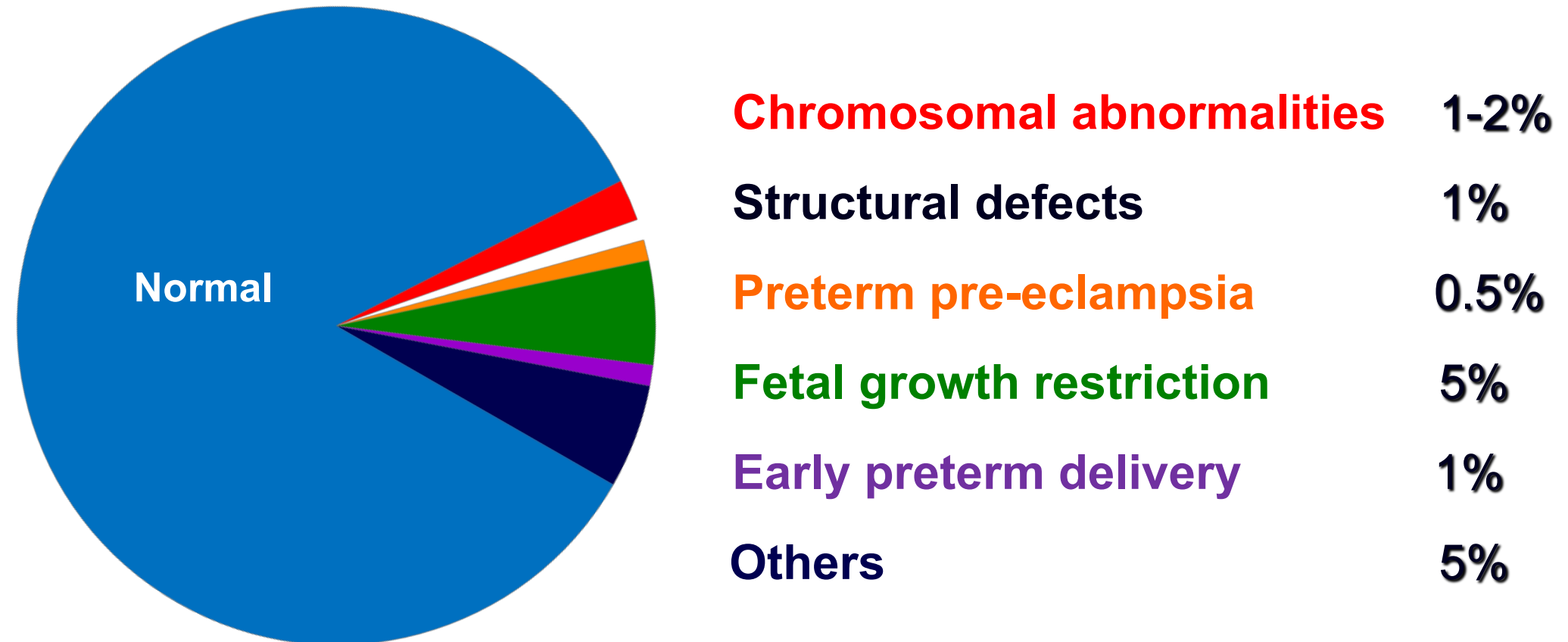


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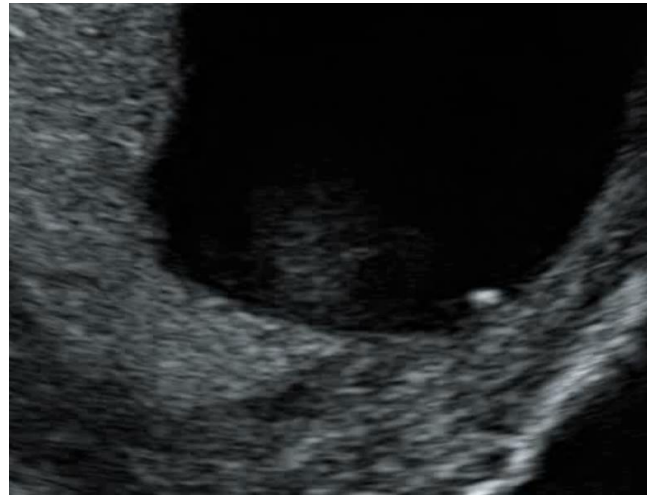
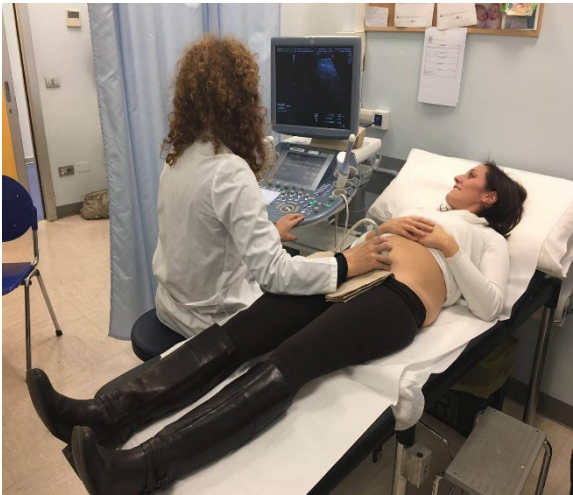
Pregnancy outcome

Average European birth rate: ~ 5 million per year





Prenatal Ultrasound



Timing of screening

11-13 wks

19-21 wks

29-31 wks



Early detection of fetal defects

**Ultrasound at 11-13 wks
(n=44,859)**

Major defects 1%

Detected 44%

Always detected 30%

Acrania

Holoprosencephaly

Exomphalos

Gastroschisis

Megacystis

Body stalk anomaly

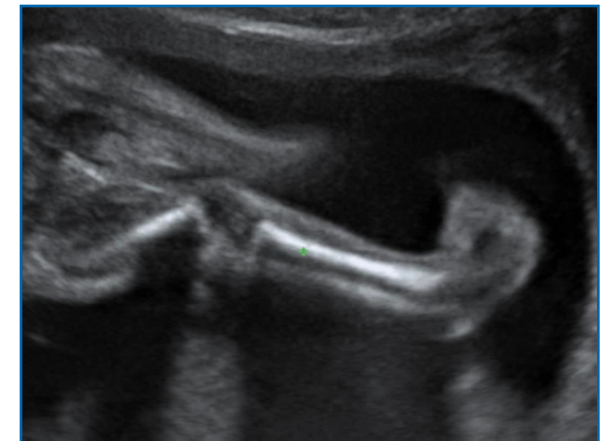
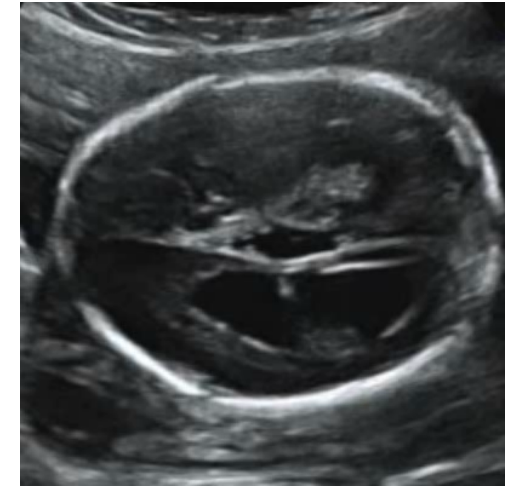




Early detection of fetal defects

Undetectable at 11-13w

Corpus callosum agenesis
CCAM /sequestration
Esophageal / duodenal atresia
Bowel obstruction
Hydronephrosis
Dysplastic kidneys
Talipes





Fetal urinary tract on ultrasound

Normal amniotic fluid after 15 weeks



Megacystis



- Prevalence: 1/1,600
- Bladder length
 - 7-15 mm resolution 90%
 - >15 mm resolution 0%
- Trisomy 13 or 18 (31%)



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Invasive diagnostic testing

CVS



Amnio



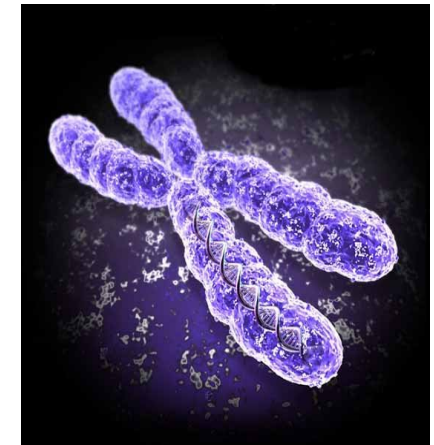
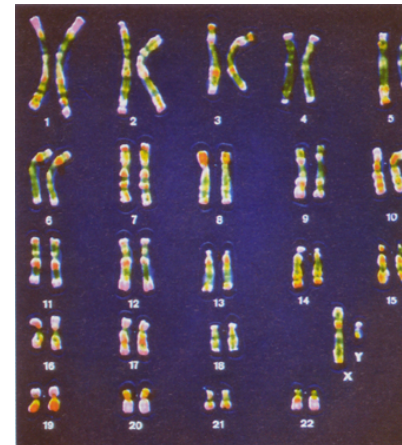
Fetal blood



Fetal karyotype

Microarray

Targeted genetic testing





Lower Urinary Tract Obstruction

Prevalence 1 in 5,000 pregnancies

- Chromosomal defects
- Genetic syndromes
- Other structural defects

Isolated LUTO

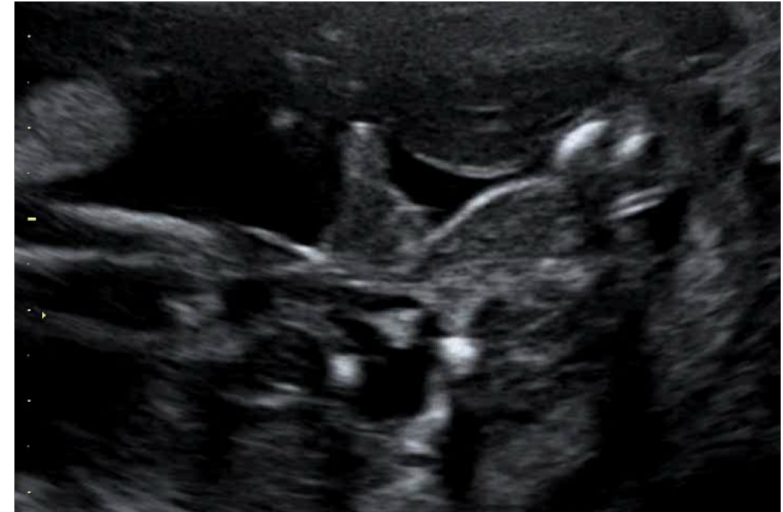
Posterior urethral valves
Urethral stenosis/atresia

High neonatal mortality

Pulmonary hypoplasia
End-stage renal disease

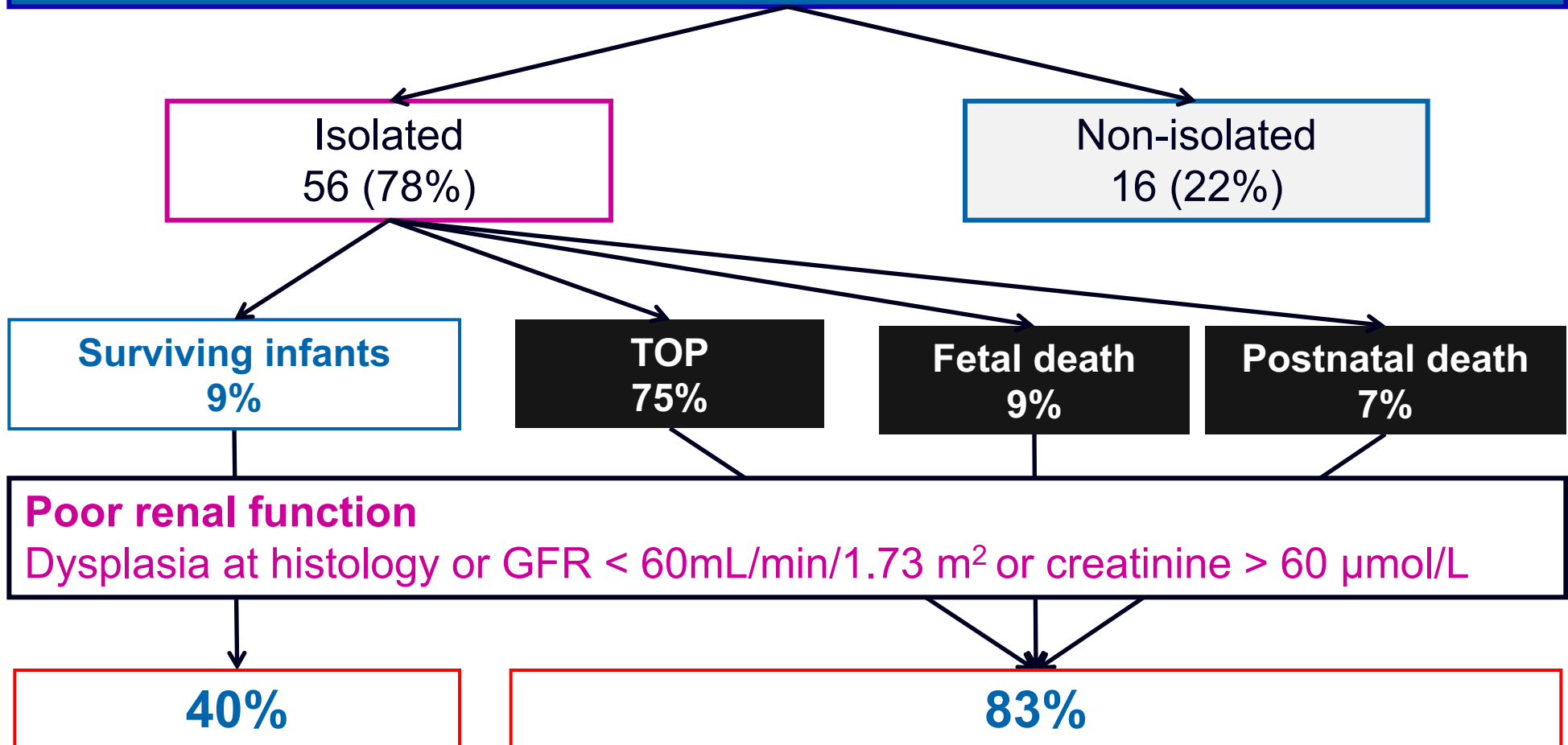
Ultrasound findings

Distended bladder with 'keyhole sign'
Oligo-anhydramnios
Hydro-ureteronephrosis
Ecogenic kidneys





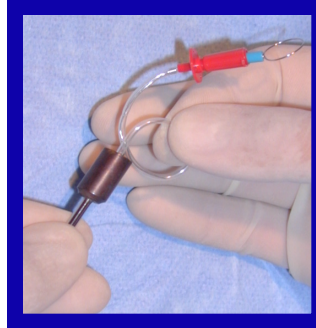
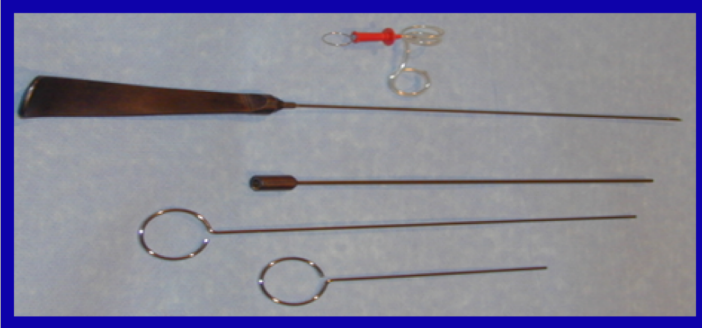
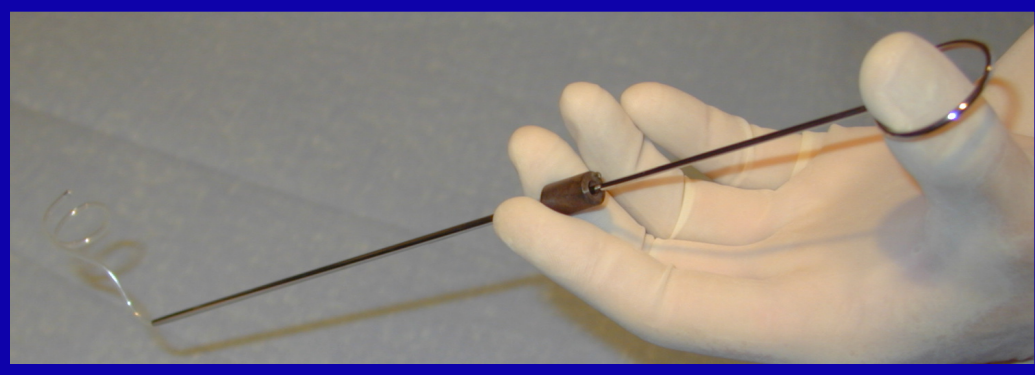
LUTO < 23 weeks - n=72



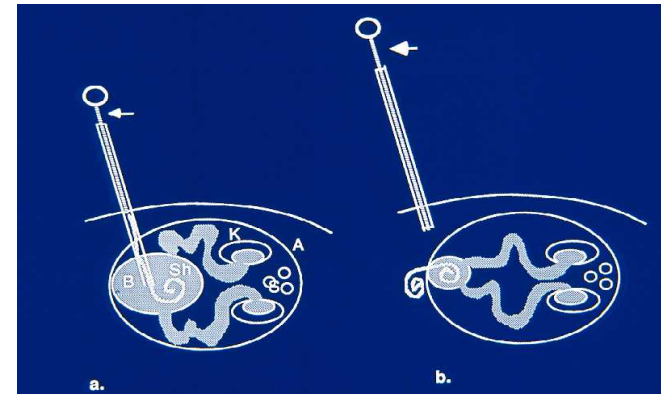


Vesicoamniotic shunting

Procedure – 16-28 weeks



- Local anesthesia
- 3 mm KCH catheter or other devices
- Antibiotic prophylaxis
- Tocolysis (Indomethacine, Nitrate)





Vesicoamniotic shunting

Perinatal survival

Shunt
n=112

57%

Expectant
n=134

39%

OR

2.54

95%CI

1.14-5.67

12 months survival

Shunt
n=43

44%

Expectant
n=91

42%

OR

1.77

95%CI

0.25-12.71

Good renal function

Shunt
n=41

68%

Expectant
n=64

48%

OR

2.09

95%CI

0.74-5.94

Shunt complications

Blockage or migration
Preterm delivery

25%

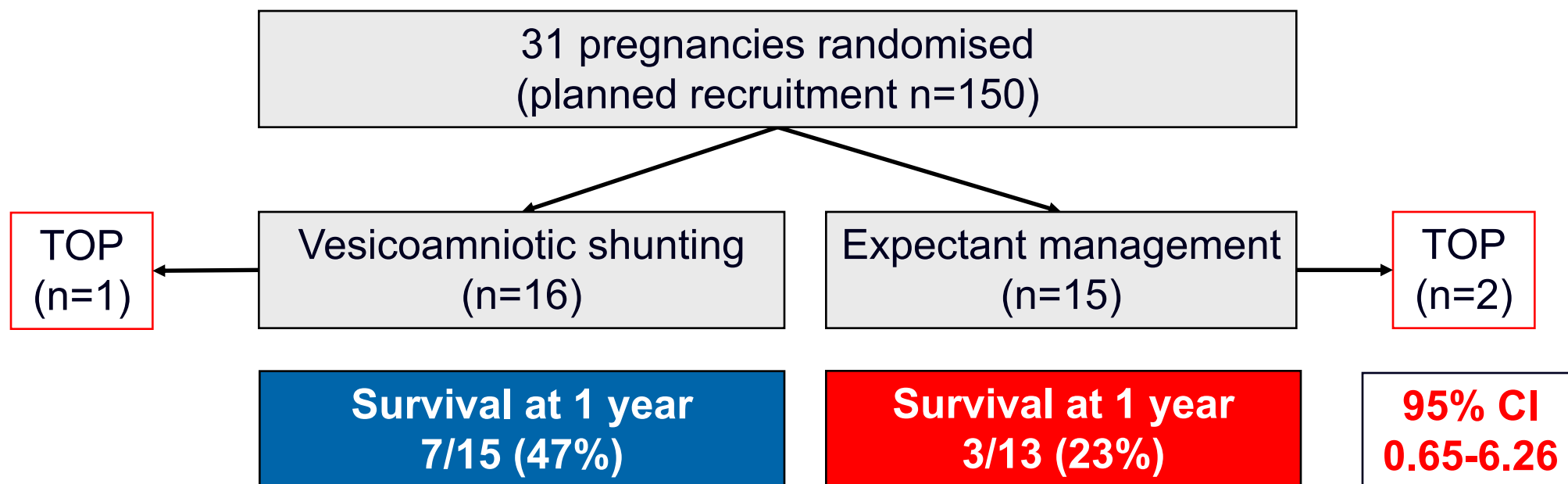
20%



Percutaneous vesicoamniotic shunting versus conservative management for fetal lower urinary tract obstruction (PLUTO): a randomised trial

Rachel K Morris, Gemma L Malin, Elisabeth Quinlan-Jones, Lee J Middleton, Karla Hemming, Danielle Burke, Jane P Daniels, Khalid S Khan, Jon Deeks, Mark D Kilby, for the Percutaneous vesicoamniotic shunting in Lower Urinary Tract Obstruction (PLUTO) Collaborative Group

Lancet 2013





Fetal cystoscopy

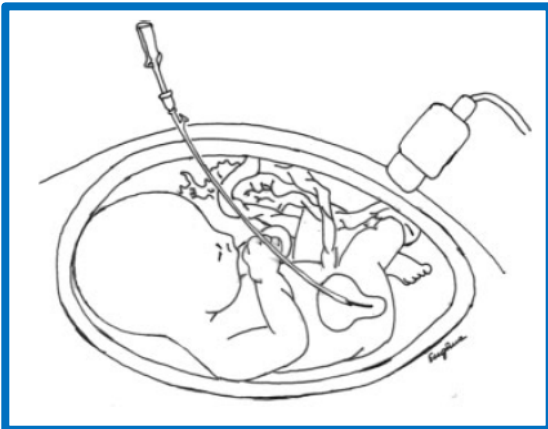
Laser ablation of posterior urethral valves

- Fetal intramuscular anesthesia
- 1-3 mm curved fetoscope
- ND:YAG or Diode laser

	Shunt (n=16)	Laser (n=34)	Nothing (n=61)
Survival at 6m	44%	38%	20%
Good renal function	60%	75%	39%

Laser complications

Urological fistulas	9%
Preterm delivery	20%



Ruano et al, 2014



Rupture of membranes after invasive procedures

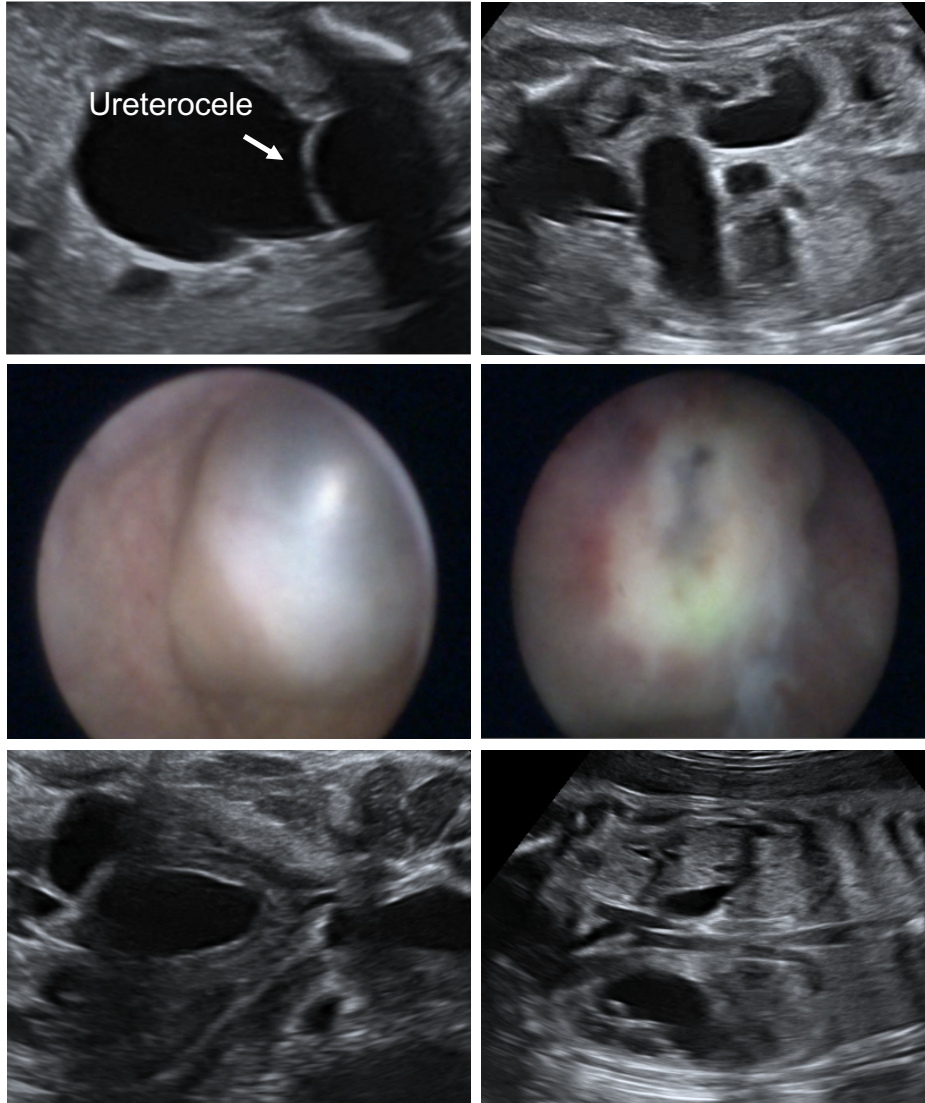


Entry (mm)	PROM (%)	Procedure
<1	0.2	Amniocentesis
2	10	Fetoscopy
3	20	Fetoscopy, Feto-amniotic shunt
4	40	Fetoscopy

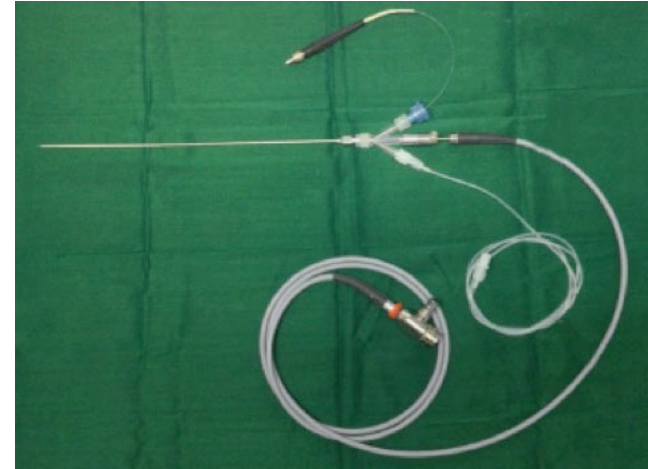


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Cystoscopic laser for fetal ureterocele



1.6mm endoscope



Persico et al, UOG 2017

Amniotic fluid and renal function

Normal amniotic fluid



Oligohydramnios



Anhydramnios



Systematic review - n=215

Outcome measures:

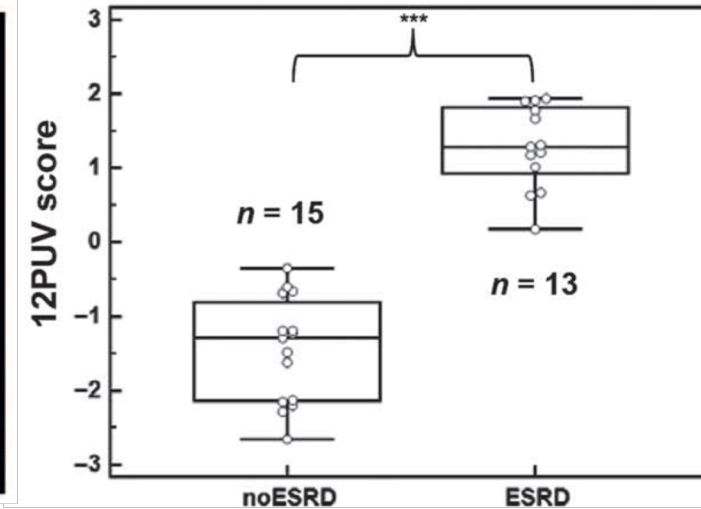
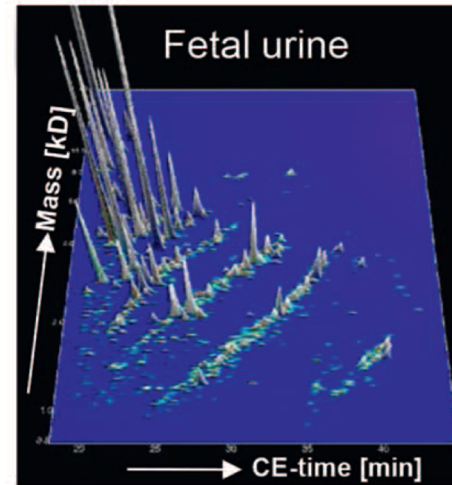
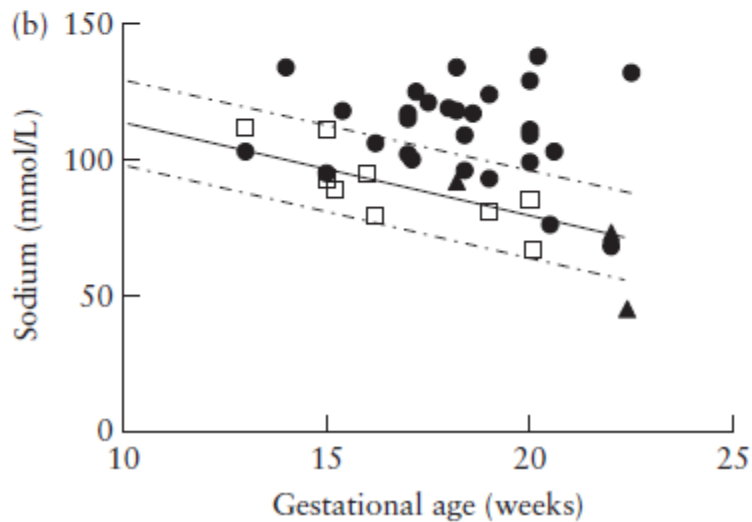
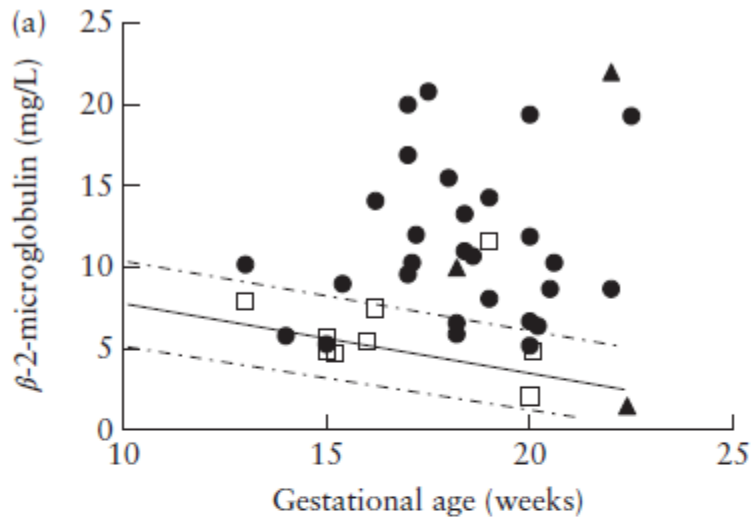
Serum creatinine
Renal histology

	Sensitivity	FPR
Oligo-anhydramnios	63%	24%
Echogenic kidneys	57%	16%



Fetal urine analysis

Proteomic analysis



	Sensitivity	FPR
β -2 microglobulin	81%	11%
Sodium	61%	0%
Proteomic	88%	5%



Proteomic urine analysis

Megacystis at 16-26 weeks on two occasions at least 1 week apart

Fetal urine sample stored

Vesicoamniotic shunt

Cystoscopic laser

Expectant

TOP

Postnatal renal function or histology

Proteomic fetal urine analysis



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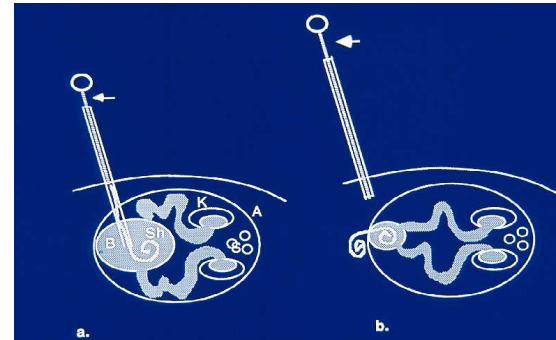
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Prenatal management of LUTO: a lot more to do

- Early screening and diagnosis
- Optimal timing for fetal intervention
- Selection criteria based on reliable assessment of fetal renal function
- Further investigation on the best technique





Centralization of cases

Bonelli Centre for the prevention of renal disease

- Obstetrics
- Pediatric Urology
- Pediatric Nephrology
- Neonatal Intensive Care
- Genetics
- Psychology



Mangiagalli Centre, Milan, Italy

Next Webinar: 8th January 2019

Access for PD and HD in children

Rukshana Shroff
London, UK



ERKNet

The European
Rare Kidney Disease
Reference Network