


# Cervix and Placenta

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Special thanks to Julie Thwaites



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# 01 CERVIX ANATOMY AND ULTRASOUND ASSESSMENT

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## CERVIX ANATOMY

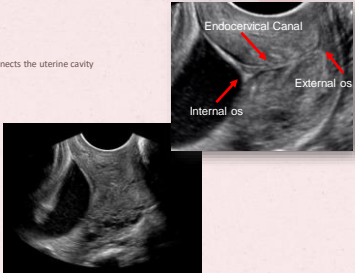
**ANATOMY**

- Narrow canal (endocervical) which connects the uterine cavity and the lumen of the vagina
- Internal os – leads into the uterus
- External os – leads into the vagina

**FUNCTION DURING PREGNANCY:**  
Biomechanical function of the cervix:

- Maintain the fetus within the uterus
- Withstands forces from:
  - The uterus
  - Weight of the growing fetus
  - Amniotic sac
  - Passive uterine wall pressure

Myers et al. (2015)



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## ULTRASOUND ASSESSMENT OF THE CERVIX


**METHODS TO ASSESS THE CERVIX**

- Transabdominal
- Transvaginal
- Translabial – event of pre-term prelabour rupture of membranes

Bohiletea et al. (2016)

**CERVIX MEASUREMENTS**

- Transabdominal >35mm
- Transvaginal >25mm



**ULTRASOUND ASSESSMENT**


- Initially assess the cervix TA
- Empty bladder
- Visualise the internal and external os
- No lower uterine segment contraction
- Measure canal in a straight line

If unable to clearly identify endocervical canal or if TA measurement is <35mm **ALWAYS** progress to a TV

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## ULTRASOUND OF THE CERVIX - LIMITATIONS

LOWER UTERINE SEGMENT CONTRACTIONS – Elongates cervix



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### ULTRASOUND OF THE CERVIX - LIMITATIONS

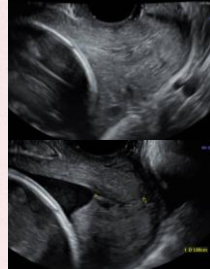
OVERFULL BLADDER – Elongates cervix



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### ULTRASOUND OF THE CERVIX – TV LIMITATIONS

BE AWARE OF:  
• LUS Contractions  
• Excessive transducer pressure



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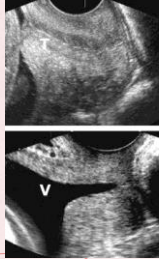
### ULTRASOUND OF THE CERVIX – THOUGHTS?

IS THE CERVIX SHORT? WHAT DO WE DO?



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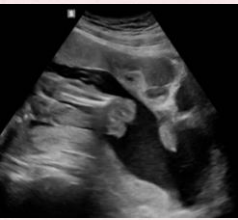
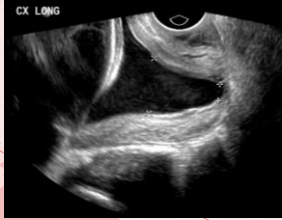
### ULTRASOUND OF THE CERVIX – FUNNELLING



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### ULTRASOUND OF THE CERVIX – LONG AND CLOSED

IS THE CERVIX LONG AND CLOSED?  
Open at the external os



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## IMPORTANCE OF THE CERVIX AND CERVICAL INCOMPETENCE

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### IMPORTANCE OF CERVIX ASSESSMENT

**PURPOSE:**  
Assessment of the cervix allows for prevention and management of preterm birth – prevalence in Australia is 8.7%


**CERVICAL INCOMPETENCE:**

- Demonstrates pathological dilation and shortening of the cervix which can lead to **miscarriage or preterm birth**.
- Considered a risk factor for preterm birth – responsible for 5% of extreme preterm deliveries <28weeks

**ASSOCIATIONS WITH CERVICAL INCOMPETENCE:**

- Infection as a result chorioamnionitis
- Bleeding
- Ruptured membranes

Wang et al (2014)



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### RISK FOR PRETERM BIRTH

**↓ LOW RISK FOR PTB**

- Single measurement of the cervix at morphology scan
- Following measurement guidelines


**↑ HIGH RISK FOR PTB**

**CAUSES:**

- Previous pre-term birth/late miscarriage
- Previous surgeries – LLETZ (treatment to the cervix for precancerous cells), cone biopsy
- Uterine malformation

**ULTRASOUND ASSESSMENT**

- Fortnightly surveillance (16-24wks)
- Surveillance always performed TV
- Cervix watched and assessed for 5 minutes
- Closed length is measured
- Shorted length is used
- Ensure excess transducer pressure is not used



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### CERVICAL INCOMPETENCE TREATMENT

**ULTRASOUND FINDINGS:**

- Transvaginal Imaging – treatment is dependent on measurements

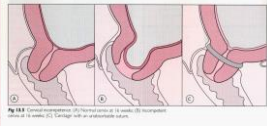
**<2.5cm**

- Treated with progesterone pessary
- Routine cervical tracking to assess cervix length

**<1.5cm**

- Treated with rescue cerclage

Romaro et al (2018)



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### PREMATURE RUPTURE OF MEMBRANES

**Associated with cervical incompetence**

**Cause:** No obvious cause


**Risk factors:**

- History of PPROM
- Short cervix
- Vaginal bleeding in 2<sup>nd</sup> or 3<sup>rd</sup> trimester
- Uterine over distension
- Nutritional deficiency
- Connective tissue disorder
- Smoking
- Illicit drug use

**Role of ultrasound:**  
Assess fetal viability  
Measure AFI  
Biometry assessment  
Assess cervix

**Cervix assessment:** transabdominal or translabial  
**NOT TRANSVAGINAL** – risk of introducing infection

Dayal and Hong (2023)



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## PLACENTA AND PLACENTAL PATHOLOGIES

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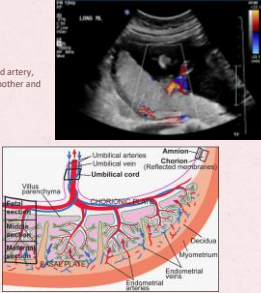
### PLACENTA

Designed for exchange of oxygen through the umbilical vein and artery, nutrients, antibodies, hormone and waste products between mother and fetus.

Consists of 3 sections:  
 Maternal section  
 Middle section  
 Fetal section

**PLACENTA LOCATIONS:**

- Anterior, posterior, lateral and fundal
- Placenta previa – covering the internal os
- Low lying <20mm from internal os
- Placenta migrates approximately 1mm/week




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### PLACENTAL VARIANTS


**BILOBAR PLACENTA**

- 2 placental masses with a central cord consisting of vessels extending to both



**SUCCENTURIATE PLACENTA**

- Single large placenta with centric cord insertion
- Smaller accessory lobe(s) connected by vessels extending from the main placental mass.




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### PLACENTAL ABNORMALITY

**CIRCUMVALLATE PLACENTA**  
 Placental margins are folded or elevated

Associations:

- Premature rupture of membranes
- Haemorrhage
- IUGR
- Placental abruption



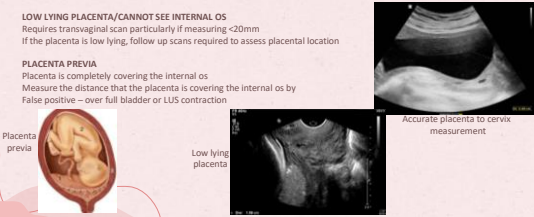
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### PLACENTA LOCATION ASSESSMENT

Document distance from the placental edge to the internal os where >20mm is reported as clear

**LOW LYING PLACENTA/CANNOT SEE INTERNAL OS**  
 Requires transvaginal scan particularly if measuring <20mm  
 If the placenta is low lying, follow up scans required to assess placental location

**PLACENTA PREVIA**  
 Placenta is completely covering the internal os  
 Measure the distance that the placenta is covering the internal os by  
 False positive – over full bladder or LUS contraction



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### PLACENTA SIZE/THICKNESS

Normal placenta thickness at 20 weeks is 2-2.5cm – placental size is an indicator of fetal wellbeing

**THIN PLACENTA**

- Maternal circulation issues – hypertension
- IUGR
- Infection
- Chromosomal abnormality

**THICK PLACENTA**

**Homogenous:**

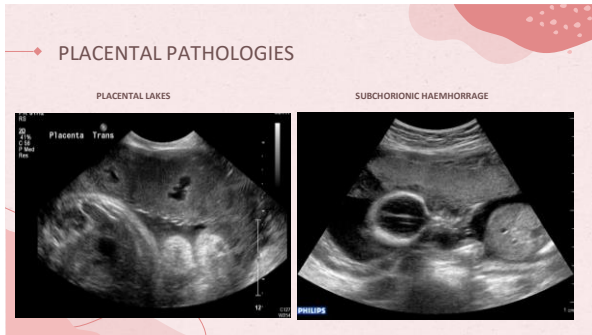
- Diabetes
- Anaemia
- Hydrops
- Infection
- Aneuploidy

**Heterogenous**

- Molar pregnancy
- Trophoblast
- Placental haemorrhage



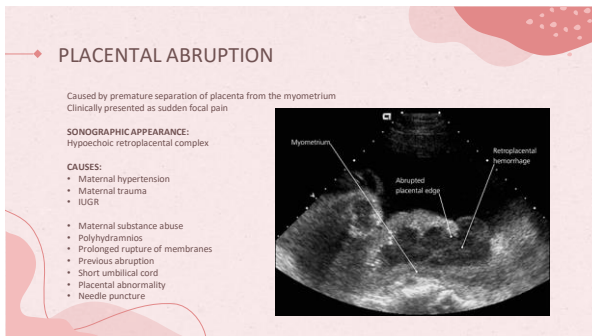
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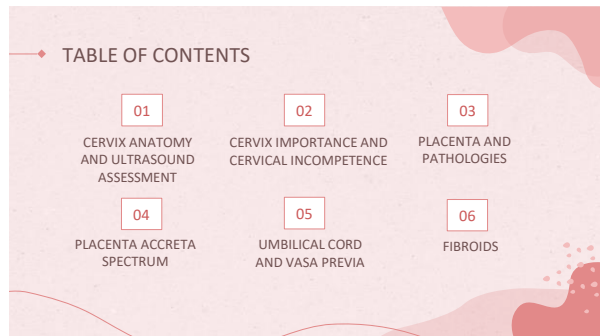
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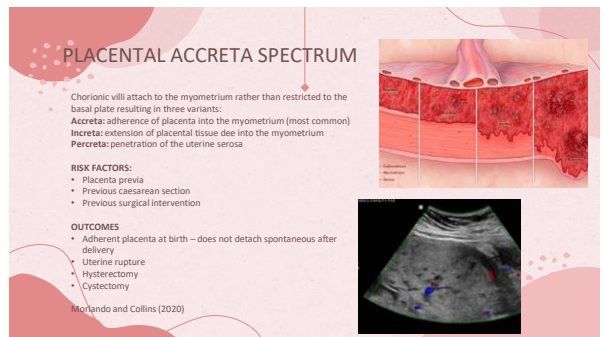
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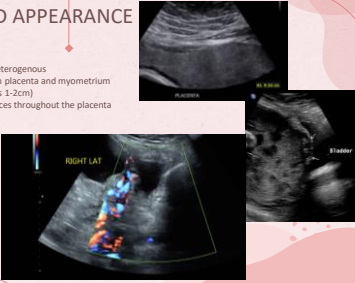
### PAS – ULTRASOUND APPEARANCE

**SONOGRAPHIC APPEARANCE – B MODE:**

- Placenta may appear thickened and heterogeneous
- Loss of hypoechoic clear zone between placenta and myometrium
- Myometrial thinning (Normal thickness 1-2cm)
- Multiple hypoechoic and anechoic spaces throughout the placenta (lacunae)
- Focal exophytic mass
- Bladder wall interruption

**COLOUR DOPPLER**

- Marked sub-placental vascularity
- Bridging vessels
- Lacunae flow



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### 05 UMBILICAL CORD AND VASA PREVIA

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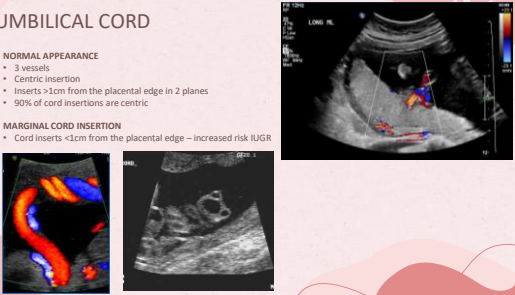
### UMBILICAL CORD

**NORMAL APPEARANCE**

- 3 vessels
- Centric insertion
- Inserts >2cm from the placental edge in 2 planes
- 90% of cord insertions are centric

**MARGINAL CORD INSERTION**

- Cord inserts <1cm from the placental edge – increased risk IUGR



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### VELEMENTOUS CORD

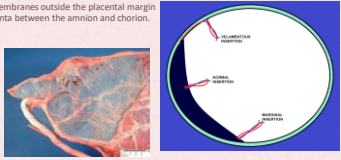
- The umbilical cord inserts into the fetal membranes outside the placental margin
- Travel within the membranes to the placenta between the amnion and chorion.

**INCIDENCE:**

- 1% of singleton pregnancies
- Increased incidence in:
  - Twin pregnancy (9%)
  - Presence of IUCD
  - Single UA
  - Placenta previa

**COMPLICATIONS**

- IUGR – monitored T3 growth
- Growth discordance in twins
- Rupture antepartum or during labour leading to catastrophic mother and fetus outcomes
- Vasa previa



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### VASA PREVIA

Fetal vessel traverse within 20mm of the internal os

- Rare – 1:1250-2700 births
- Results in devastating outcomes – haemorrhage occurs when vessels are torn at delivery
- Neonatal survival rate on a study of 155 women with vasa previa:
  - 97% diagnosed cases
  - 44% not diagnosed cases

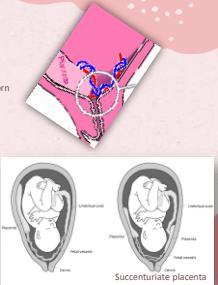
**HIGH RISK**

- Succenturiate placenta – vessels traverse between lobes
- Low lying placenta
- IVF pregnancy
- Multiple pregnancies
- 17% no identifiable risk factors

**PITFALLS**

- Flash artefact from fetal movement
- Maternal vessels – check arterial rate/Valsalva response

Imperative to check internal os with colour Doppler for traversing vessels sweeping from one side to the other



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### VASA PREVIA

B-mode image demonstrates the placenta is anterior and posterior – bilobed or succenturiate lobe. Colour Doppler demonstrates fetal vessel traversing the internal os between anterior and posterior lobes

Result significantly improves fetal survival rate

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### 06 FIBROIDS

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### FIBROIDS

- Most common benign uterine tumour
- Originate from the myometrium and growth is dependent on estrogen and progesterone

**FIBROID ASSESSMENT IN PREGNANCY**

- Measure size
- Assess their location
- Determine distance from the internal os of the cervix
- Their location can impact delivery management
- Assessed later in third trimester

De La Cruz and Buchanan (2017)

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### TAKE HOME MESSAGES

**CERVIX**

- Be careful when measuring
- If unsure perform transvaginal scan
- Always assess internal os with colour Doppler

**PLACENTA**

- Assess position, size and shape
- Scan through the whole placenta

**CORD**

- Insertion position is important
- Assess in 2 planes
- Measures from the edge of placenta

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### REFERENCES

- RioHites et al. (2016) A debate about ultrasound and anatomic aspects of the cervix in spontaneous preterm birth. *J Med Life*. 2016 Oct-Dec;9(4):342-347. PMID: 27928435; PMCID: PMC5141391.
- Bronson et al (2007) Effect of a low-lying placenta on delivery outcome <https://doi.org/10.1002/ijug.6304>
- Dayal, S. and Hong, P.L. (no date) 'Premature Rupture of Membranes', in *National Centre for Biotechnology Information. StatPearls*. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK532888/>.
- De La Cruz, M.D. and Buchanan, E.M. (2017) 'Uterine Fibroids: Diagnosis and Treatment', *American Family Physician*, 92(2).
- Friedman et al Can transabdominal ultrasound identify women at high risk for short cervical length? *Acta Obstetrica et Gynecologica Scandinavica* 92 (2013) 637–641
- Jansen et al Vaginal delivery in women with a low-lying placenta: a systematic review and meta-analysis (BJOG 2019)
- Jauniaux et al From Etiopathology to Management of Accreta/Placentaation (Current Obstetrics and Gynecology 2019)
- Marfando, M and Collins, S. (2018) 'Placenta accreta spectrum disorders: Challenges, risks, and management strategies', *International Journal of Women's Health*, Volume 12, pp. 1033–1045. doi:10.2147/ijwh.s124191.
- Myers, K.M. et al. (2015) 'The mechanical role of the cervix in pregnancy', *Journal of Biomechanics*, 48(9), pp. 1511–1523. doi:10.1016/j.jbiomech.2015.02.065.
- Romero et al. (2018) Vaginal progesterone for preventing preterm birth and adverse perinatal outcomes in singleton gestations with a short cervix: A meta-analysis of individual patient data. *American J Obstet Gynecol* 218:161
- Wang et al.(2014) Effects of Maternal Cervical Incompetence on Morbidity and Mortality of Preterm Neonates with Birth weight Less than 2000g. *- (Iran Ped Journal 2014)*

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