TTTS or TAPS SURVEILLANCE
OB ULTRASOUND PROTOCOL

TTTS (Twin to Twin Transfusion Syndrome)
TAPS (Twin Anemia Polycythemia Sequence)

****Surveillance should start at 16 weeks and should be performed every 2 weeks when a pregnancy is determined at risk.**

****UA and MCA Dopplers will be performed at all TTTS surveillance ultrasounds beginning at 16 weeks.**

****Additional Doppler images of the ductus venosus should be obtained if absent or reversed diastolic flow is seen in the umbilical artery, or if requested.** **(BILLING CODE: UOBORGDL)**

TIMELINE FOR SURVEILLANCE

- **16 weeks: EARLY ANATOMY** w/ TTTS surveillance with UA and MCA Dopplers
- **18 weeks: LIMITED OB** w/ TTTS surveillance with UA and MCA Dopplers
- **20 weeks: DETAILED ANATOMY & TVCL** w/ TTTS surveillance with UA and MCA Dopplers
- **22 weeks LIMITED OB** w/ TTTS surveillance with UA and MCA Dopplers
- **24 weeks: F/U GROWTH** w/ TTTS surveillance with UA and MCA Dopplers
- **26 weeks: LIMITED OB** w/ TTTS surveillance with UA and MCA Dopplers
- **28 weeks: F/U GROWTH** w/ TTTS surveillance with UA and MCA Dopplers
- **Every 3-4 weeks: F/U GROWTH** w/ TTTS surveillance with UA and MCA Dopplers until **36 weeks**

2ND/3RD TRIMESTER, EARLY ANATOMY	76805 - signle/first gestation 76810 - each addt gestation	**TWINS**	**US OB EARLY ANATOMY SECOND TRIMESTER TWINS**	UOBEATWIN	04020027 - 76805 04020028 - 76810
		TRIPLETS	**US OB EARLY ANATOMY SECOND TRIMESTER TRIPLETS**	UOBEATRIP	04020027 - 76805 04020028x2 - 76810x2
		QUADS	**US OB EARLY ANATOMY SECOND TRIMESTER QUADRUPLETS**	UOBEAQUAD	04020027 - 76805 04020028x3 - 76810x3
2ND/3RD TRIMESTER, DETAILED ANATOMY	76811 - gingle/first gestation 76812 - each addt gestation	**TWINS**	**US OB SECOND THIRD TRIMESTER ANATOMY TWINS**	UOBTWINC	04020029 - 76811 04020030 - 76812
		TRIPLETS	**US OB SECOND THIRD TRIMESTER ANATOMY TRIPLETS**	UOBTRIPC	04020029 - 76811 04020030x2 - 76812x2
		QUADS	**US OB SECOND THIRD TRIMESTER ANATOMY QUADRUPLETS**	UOBQUADC	04020029 - 76811 04020030x3 - 76812x3
FOLLOW UP	76816 -follow up, per fetus	**TWINS**	**US OB TWIN FOLLOW UP**	UOBTWINFU	04020034x2 - 76816x2
		TRIPLETS	**US OB TRIPLET FOLLOW UP**	UOBTRIPFU	04020034x3 - 76816x3
		QUADS	**US OB QUAD FOLLOW UP**	UOBQUADFU	04020034x4 - 76816x4
LIMITED	76815 - limited	**TWINS**	**US OB LIMITED TWIN**	UOBLTWIN	04020033 - 76815
		TRIPLETS	**US OB LIMITED TRIPLET**	UOBLTRIP	04020033 - 76815
		QUADS	**US OB LIMITED QUAD**	UOBLQUAD	04020033 - 76815

TTTS SURVEILLANCE IMAGES TO OBTAIN

Additional images to be included for Anatomy or Growth as applicable. See corresponding protocols for image requirements.

FETAL POSITIONS:

- Document and label fetal positions on images and in Viewpoint report under the Presentation section.

FETAL MEMBRANES:

- Document the free-floating membrane between each fetus and ensure membrane is not adhered to fetus.

FETAL HEART RATES:

- M-mode sweep with fetal heart rates measured.

AMNIOTIC FLUID VOLUMES:

- Maximum vertical pocket (MVP) for each fetus.
- For Mono/Mono gestations, use a four pocket AFI measurement.

FETAL ANATOMY:

- **BLADDER** in transverse assessing size and distention
- **BILATERAL LATERAL VENTRICLES** to assess for ventriculomegaly and IVH.
- **DOCUMENT PRESENCE OR ABSENCE OF FETAL HYDROPS.** Assess for: abdominal ascites, pericardial or pleural effusion, and extremity or scalp edema.

UMBILICAL ARTERY DOPPLER: To be included routinely beginning at 16 weeks. UA Doppler should be obtained for each fetus.

TECHNIQUE:

- 3 spectral doppler samples of the umbilical artery to be taken within the middle section of the umbilical cord.
- The sample with the highest S/D ratio should be documented in the OB report.
- Avoid being close to the fetus or placental cord insertions. If necessary, the cord can be traced from fetal cord insertion to ensure the proper fetal cord is documented in cases where it is challenging to determine which cord corresponds to a certain fetus. In this case, it should be clearly stated on the report that the doppler was obtain at the fetal end to accurately compare to prior and future measurements.
- If a dramatic difference is seen in S/D ratios between exams, BOTH umbilical arteries should be sampled and compared. There are cases where one artery has normal flow, and the other is abnormal. Describe this in the report if this is the case.

INTERPRETATION:

- An umbilical artery S/D ratio of > 95th percentile is considered abnormal.
- If absent end diastolic flow (or reversed diastolic flow) is seen, this needs to be reported urgently via a phone call to the clinical team before the patient leaves. The patient may be admitted.
- If absent or end diastolic flow is present additional imaging of ductus venosus is indicated.
- Absent or reversed diastolic flow does not mean that the S/D is = 1. For these cases, only include the peak systolic velocity and report these as “Absent diastolic flow,” or “Reversed diastolic flow.”

MIDDLE CEREBRAL ARTERY DOPPLER: To be included routinely beginning at 16 weeks. MCA Doppler should be obtained for each fetus.

TECHNIQUE:

- An axial image of the head should be taken at the level of biparietal diameter.
- The image of the head should fill > 75% of the screen
- Color flow mapping using the smallest possible color box should be used to identify the Circle of Willis and proximal MCA.
- The pulse wave Doppler sample gate should be set at a width of 2 mm and placed on the proximal 1/3 of the MCA, preferably just distal to its origin from the internal carotid artery.
- The high-pass filter should be set between 50-60 Hz with sweep speed to capture 4-8 cardiac cycles. Fetus should be at rest, without breathing.
- The angle of insonation should be kept as close as possible to 0 degrees.
- Angle correction should be less than 30 degrees when used only when a zero degree angle has been attempted and can not be obtained.
- Pressure by the transabdominal probe should be avoided.
- Only use the anterior most MCA, the posterior MCA should never be used.
- At least 3 valid measurements should be taken.
- Do not use auto trace for the MCA velocities. Only manually measure the PSV. This is also the only value that should be reported.
- Report the highest velocity from the 3 measurements

INTERPRETATION:

- Increased peak systolic velocity in the MCA can be suggestive of developing fetal anemia TAPS.
- The risk of anemia is highest in fetuses with a pre-transfusion peak systolic velocity of 1.5 times the median or higher.

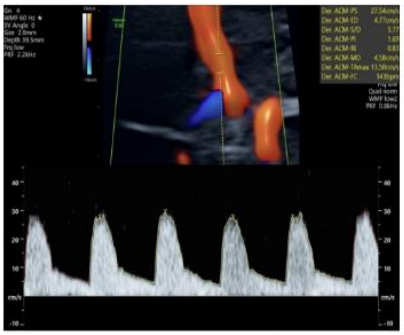
isuog

Doppler assessment of the fetal cerebral circulation

Identification of the vessels forming the circle of Willis. MCA, middle cerebral artery; PCA, posterior cerebral artery; ACA, anterior cerebral artery; PCoA, posterior communicating artery

isuog

Doppler assessment of the fetal cerebral circulation



Correct pulsed-Doppler interrogation of the MCA. The image is optimized, as the MCA occupies more than 50% of the screen, 4 similar waveforms are obtained and analyzed, the high-pass filter is set in 60 Hz (*), and the Doppler sample volume is applied to the center of the vessel with a width of 2 mm.

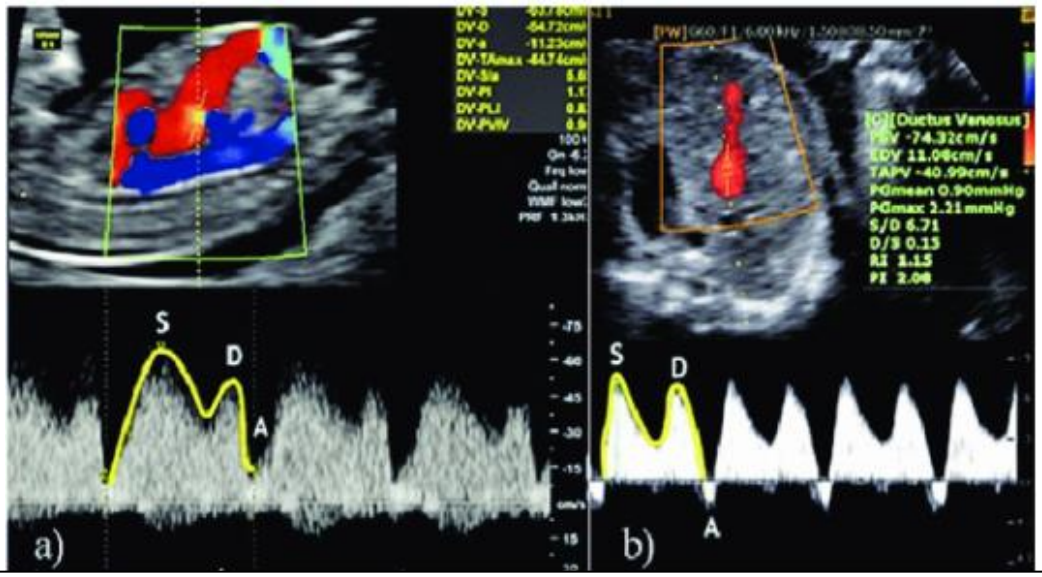
DUCTUS VENOSUS: To be performed as requested, or if absent or reversed umbilical artery doppler is observed.

TECHNIQUE:

- Sample where the umbilical vein joins the ductus venosus and where color aliasing can often be seen.
- The sweep speed should be set high enough for best assessment of the A wave.
- Set the wall filter low enough so that the A wave is not obscured
- Fetus should be as still as possible, variability in the heights of the S and D waves may indicate fetal breathing, which is normal, but wait for the fetus to be more still before evaluating.

INTERPRETATION:

- Flow should always be in a forward direction towards the heart.
- Flow in the ductus venosus has a characteristic triphasic waveform. This triphasic waveform comprises of:
  - S wave: corresponds to fetal ventricular systolic contraction and is the highest peak
  - D wave: corresponds to fetal early ventricular diastole and is the second highest peak
  - A wave: corresponds to fetal atrial contraction and is the lowest point in the wave form albeit still being in the forward direction, reversal of the A wave is always abnormal.



a) Doppler of the ductus venosus with normal triphasic flow obtained with the sample volume of the pulsed Doppler in the sagittal plane. b) An abnormal reversed A wave obtained in a transverse plane. S=systolic; D=Diastolic; A=pre-systolic wave.

REFERENCE:

Society for Maternal-Fetal Medicine Consult Series #72: Twin-twin transfusion syndrome and twin anemia-polycythemia sequence - American Journal of Obstetrics & Gynecology

TTTS/TAPS SCREENING PROTOCOL HISTORY

	Date	Changes made	By whom
Created	5/17/2022		TTTS meeting attendees: Alyssa Stephenson-Famy, Manjiri Dighe, Shani Delaney, Shaun Bornemeier, Becky Marion, Renee Betit Fitzgerald
Added	12/6/2022	Lateral Ventricle added to anatomy requirements	Manjiri Dighe Renee B Fitz
Added	12/15/2022	Ductus venosus section Flow chart added for additional imaging if abnormal.	Manjiri Dighe Renee B Fitz
Change	12/15/2022	~~MCA dopplers will not be performed as part of the routine TTTS surveillance unless requested by provider~~ Changed to - Perform MCA Doppler as requested, or if absent or reversed umbilical artery doppler is observed.	Manjiri Dighe Renee B Fitz
Change	11/19/2024	UA and MCA to be routinely performed starting at 20 weeks at all TTTS screenings. Only to be done if requested prior to 20 wks. Change made per SMFM guideline #72	Protocol meeting attendees 10/31/2024 Edith Cheng, Jane Hitti, Manjiri Dighe, Shaun Bornemeier, Becky Marion, Renee Betit Fitzgerald
Change	1/23/2025	MCA and UA to be routinely done at 16w and 18w surveillance, not just by request	Protocol meeting attendees 1/23/25 E Cheng, M Dighe, K Ma, M Richley, S Swati, C Cheng, S Bornemeier, B Marion, R Betit Fitzgerald, P Thompson
Change	4/30/2025	MCA Statement updated: -30 degree angle correction is ok -Only use manual measurement of PSV of MCA	Protocol meeting attendees 4/24/25 E Cheng, A Hollard, M Dighe, K Ma, S Swati, S Bornemeier, B Marion, R Betit Fitzgerald, D Edden