CLINICAL PRACTICE GUIDELINE

Cord blood collection / analysis at birth

This document should be read in conjunction with the Disclaimer

Aim

To collect cord blood samples **at birth** that will enable the detection of respiratory and metabolic acidosis if present following birth.

Key Points

1. Umbilical cord blood gas sampling is the most objective determinant of fetal metabolic condition at the moment of birth.[1]
2. Collection of arterial and venous cord blood samples are taken for all births whenever possible.[1,2]
3. If is preferable to obtain both arterial and venous umbilical cord blood samples for analysis. If only one sample is taken it is preferable that it is the arterial sample.
4. A cord blood sample in a heparinised syringe is stable for up to 60 minutes at room temperature.

Equipment Required

- Gloves
- Heparinised syringes x 2
- Needles 21g x 2
- Face shield
- 5 clamps
- Optional ice and water

Procedure

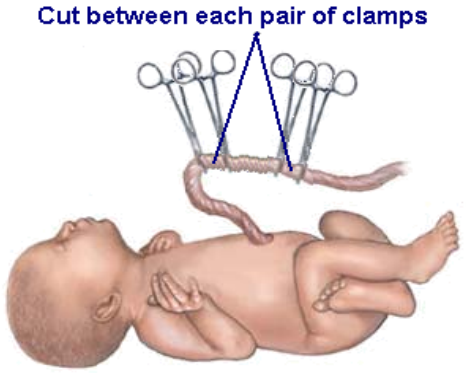
1 Optimal collection of a clamped umbilical cord segment will occur:

- Immediately after birth while the placenta is still in situ
- before the baby's first breath.

Delayed umbilical cord clamping may result in significant decreases in arterial blood pH, and increases in arterial blood pCO2 and base excess.

2 Place four (4) Howard Kelly forceps on the cord to isolate a 20cm segment in the middle.

Cut between the two sets of clamps so that the isolated segment is independent, and both the baby and the placenta still have a clamp in place

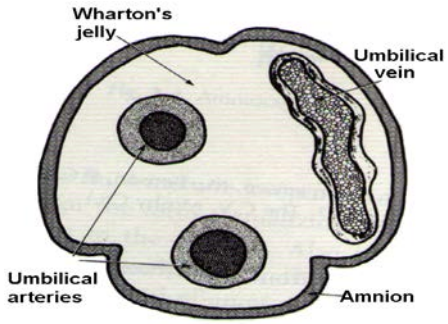


3 Continue usual post birth care of the baby.

4 Collect cord blood (from the placental end of the cord) into a red / pink-topped bottle (EDTA tube).

5 When collecting the blood for CBG gas analysis:

- use heparinised blood gas syringes (pre packed if available)
- Withdraw a minimum of 0.2mL of blood from the artery first, discard the needle into the sharps container and expel any air from the syringe before capping with the stopper provided.



- Obtain a venous sample with the second syringe, discard the needle into the sharps container, expel any air and cap the syringe with the stopper provided.

Note: ensure the syringe is upright and the safe cap is insitu prior to doing this.

6 When labelling the CORD blood:

The samples/syringe are labelled with the mothers URMN sticker and identified as arterial or venous, this will facilitate the processing and recording of results by the radiometer. As the results are part of the maternal obstetric history and the results are reported as CORD blood of the mother.

7 Analyse the samples as soon as possible after their collection.

- Arterial and venous blood stored in a doubly clamped segment of cord at room temperature is stable for ph and blood gas assessment for up to 60 minutes at room temperature.[3] Placing the syringes on ice may minimise changes from continued metabolism.[3]
- Blood sampling for lactate concentration in arterial and venous umbilical cord blood may become unreliable if not analysed within 20 minutes of birth.

8. Check the results are compatible with one arterial and one venous sample by ensuring that the:
   - Arterial pH is < the venous pH (by at least a difference of 0.022 units) and
   - Arterial pCO2 is > the venous pCO2 (by at least a difference of 5.3 mm Hg

   Note: Fetal carbon dioxide is removed from the arterial blood in the placenta, therefore the umbilical venous blood should have a slightly higher pH and a lower carbon dioxide level than the umbilical arterial blood.
9. If the sample does not meet the criteria of point 8, repeat the blood collection from the second segment of isolated cord.
10. Record the results.
11. Report the following abnormal cord blood gas results to the LBS medical team AND neonatal team caring for baby.
    - Arterial pH <7.10 or Venous pH <7.20 if no arterial sample collected
    - Arterial Base Excess < -9.0 or Venous BE < -7.7 if no arterial sample collected
    - Arterial or venous Lactate >6.1

Normal Cord Blood Gas and pH (during and post labour)

At term	pH	Base Excess mmol/L	**pO_2** mm Hg	**pCO_2** mm Hg
UA	**7.10 – 7.38**	**-9.0 – 1.8**	**4.1 – 31.7**	**39.1 – 73.5**
UV	**7.20 – 7.44**	**- 7.7 – 1.9**	**30.4 – 57.2**	**14.1 – 43.3**

normal Arterial cord blood lactate = < 6.1mmol/L

References

1. American College of Obstetricians and Gynecologists. ACOG Committee Opinion Number 348 Umbilical Cord Blood Gas and Acid-Base Analysis. **Obstetrics & Gynecology**. 2006;108(5):1319-22.
2. White CRH, Doherty DA.,Cannon JW.,Kohan R. Newnham JP, Pennell CE. Cost Effectiveness of Universal umbilical cord blood gas and lactate analysis in a tertiary level maternity unit. **Journal of Perinatal Medicine**. DOI:10.15/jpm-2015-0398. March 2016
3. Society of Obstetricians and Gynaecologists of Canada (SOGC**). Fetal Health Surveillance: Antepartum and Intrapartum Consensus Guideline.**2007

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