



Precision in Neonatal Umbilical Access

Evidence-based protocols, exact radiological targeting, and integration with the NeoFast application

Diagnostic Synthesis: Choosing the Right Line

Umbilical Venous (UVC)



Indications

Emergency access
Hypertonic fluids
Exchange transfusion

Typical Timing

Insert soon after birth.
Avoid >24hrs due to
colonization risk.

Umbilical Arterial (UAC)



Indications

Invasive BP monitoring
Frequent blood sampling
Ventilated / <27 weeks

Typical Timing

Insert soon after birth.
Avoid >24hrs due to
colonization risk.

Long Line (PICC)



Indications

Prolonged Parenteral
Nutrition (PN)
Locally toxic solutions
(inotropes)
Exhausted peripheral
access

Typical Timing

Usually >7 days of age
(when UVC is removed).

Catheter Sizing Constraints

UVC Sizing



< 1500g = 3.5F
(single lumen)
> 1500g = 5F

UAC Sizing



< 1000g = 2.5F
≥ 1200g = 3.5F



CRITICAL WARNING:
NEVER use a 5F
catheter for UAC!

PICC Sizing

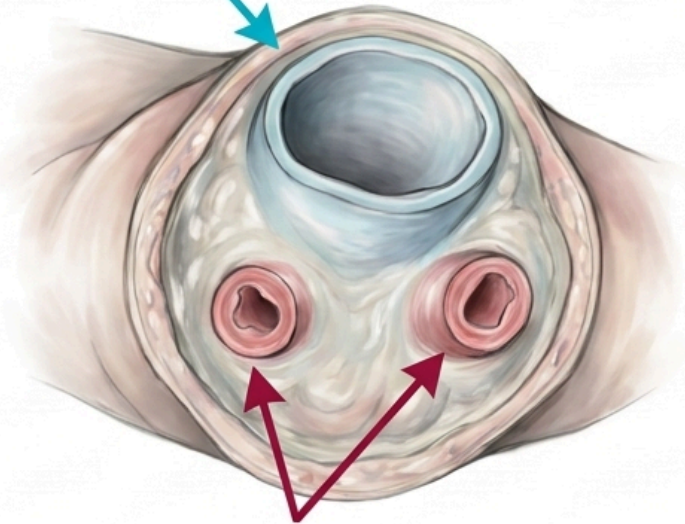


Infants >1kg: 2Fr
(24G) double lumen
(preferred for multiple
meds, handles higher
pressure).

Smaller infants:
2Fr (24G) single
lumen.

Aseptic Foundation & Navigating the Stump

The Vein (UVC): One large, thin-walled opening located in the superior position.



The Arteries (UAC): Two smaller, thick-walled, tightly constricted openings located in the inferior position.



- ☐ 1. Strict 2-person procedure. If you are visual intest.
- ☐ 2. Antisepsis: Chlorhexidine 1% (>27 weeks) or Povidone-iodine 10% (≤ 27 weeks).
- ☐ 3. Wait 30 seconds for skin prep to dry completely.

Procedural Note: Tie cord loosely before cutting to prevent excess bleeding. Use fine dilator to gently ease constricted arteries open.

The Calculation Challenge: Manual Formulas

Formula 1: UVC

(Umbilicus to Nipple - 1cm)
+ Stump Length

Weight Alternative:

$(1.5 \times \text{wt in kg}) + 5.5\text{cm} + \text{Stump}$

Formula 2: UAC

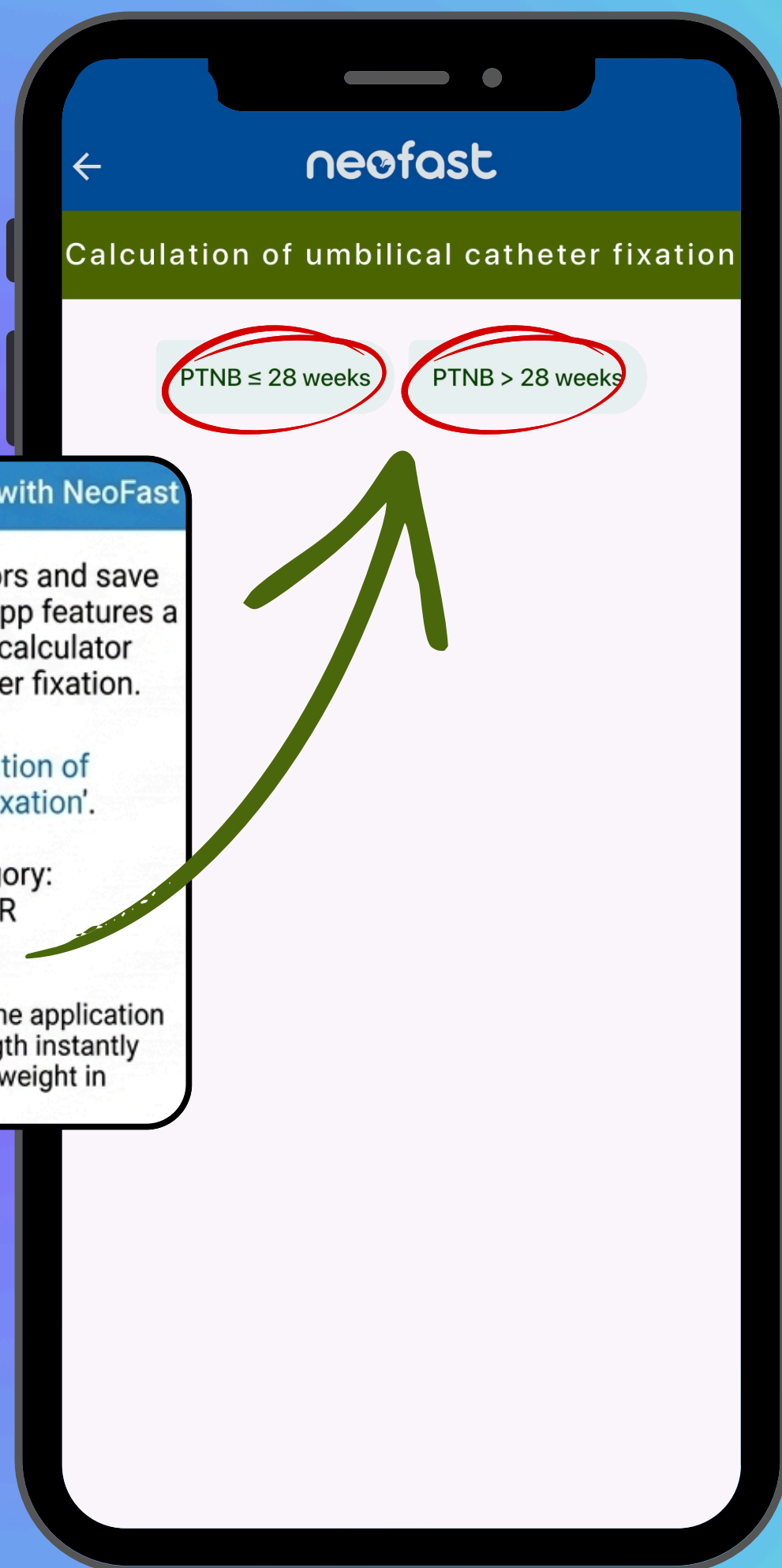
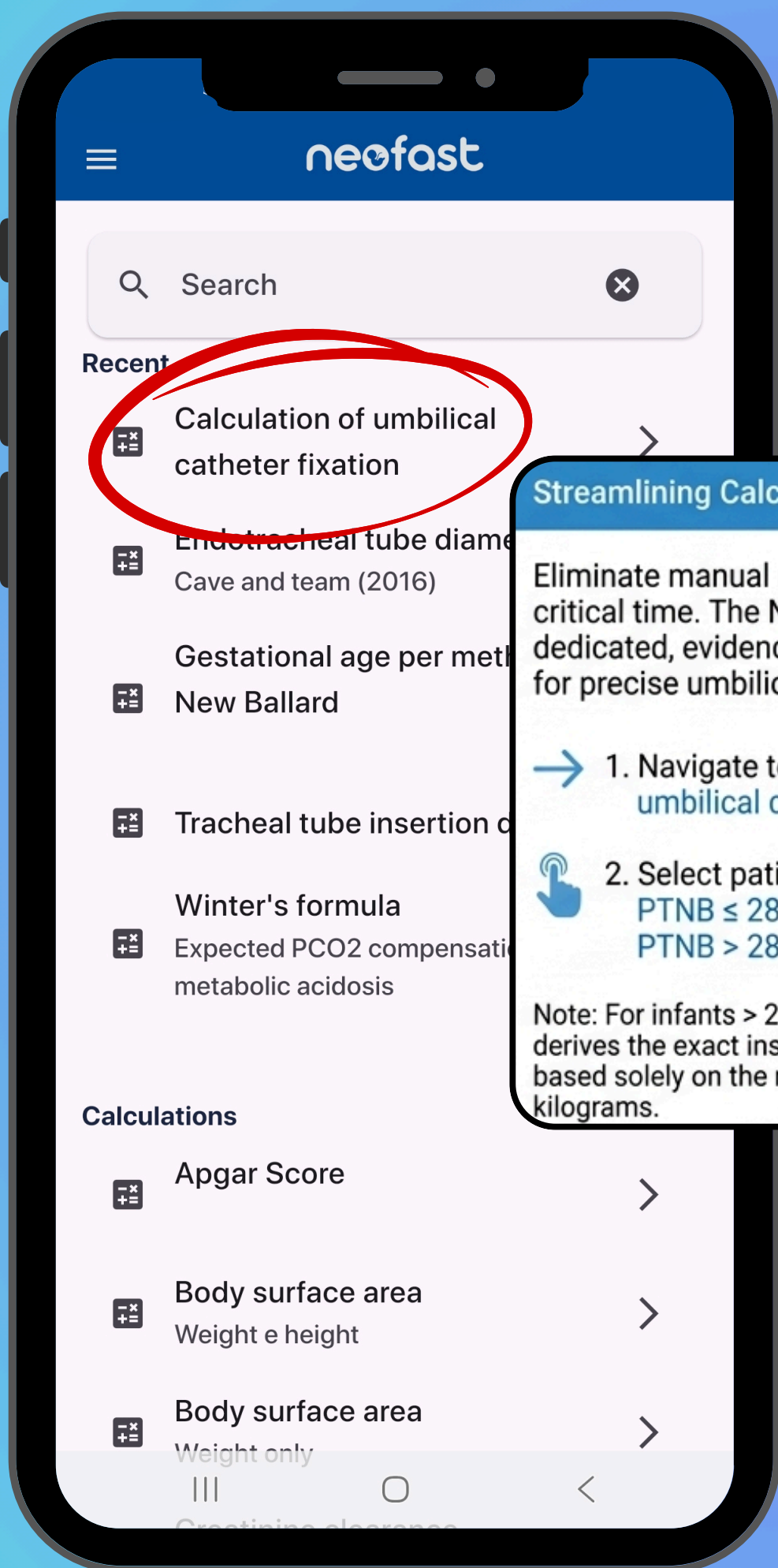
(Umbilicus to Nipple - 1cm)
+ 2 × (Umbilicus to Pubis)
+ Stump Length

Weight Alternative:

$(3 \times \text{wt in kg}) + 9\text{cm} + \text{Stump}$

The Manual Catch:

Always remember Always remember to **add** the **length** of the umbilical stump (usually **1-2cm**) to your final calculation. Omissions lead to malpositioning.



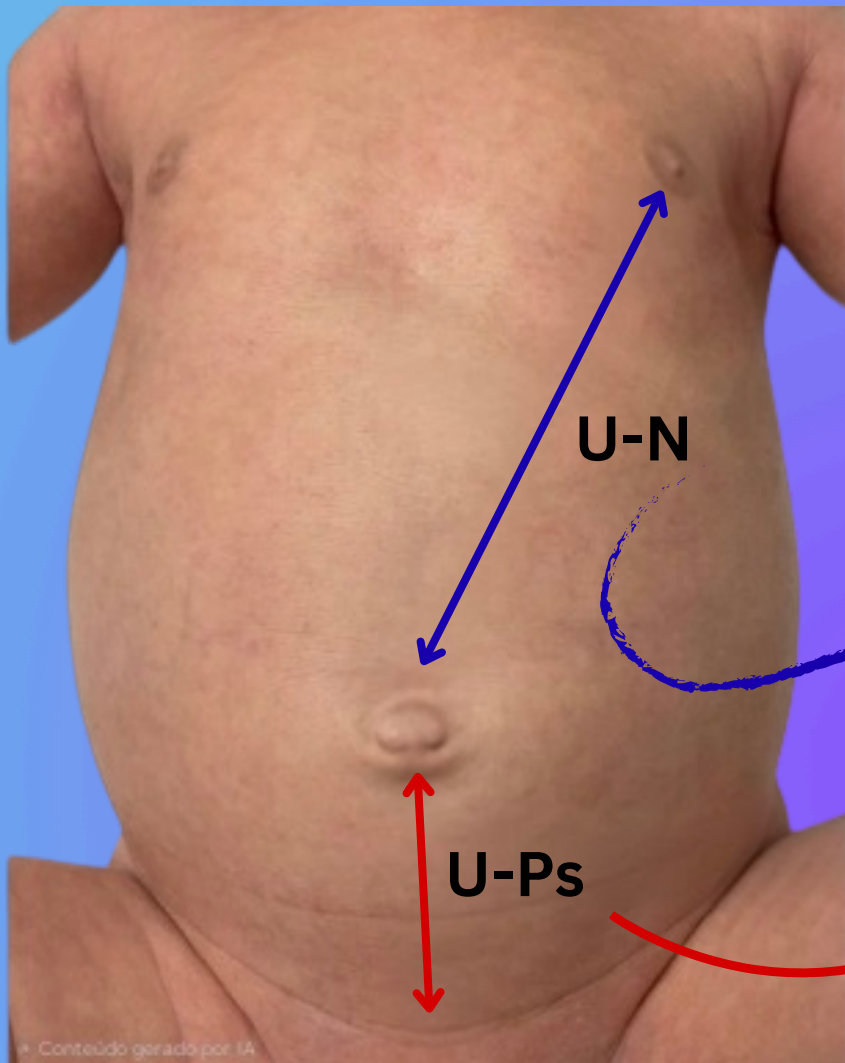
Streamlining Calculations with NeoFast

Eliminate manual math errors and save critical time. The NeoFast app features a dedicated, evidence-based calculator for precise umbilical catheter fixation.

- 1. Navigate to 'Calculation of umbilical catheter fixation'.
- 👆 2. Select patient category:
**PTNB ≤ 28 weeks OR
PTNB > 28 weeks.**

Note: For infants > 28 weeks, the application derives the exact insertion length instantly based solely on the newborn's weight in kilograms.

Landmark-Based Fixation Inputs (≤ 28 Weeks)



The screenshot shows the 'neofast' app interface. At the top, there's a back arrow and the 'neofast' logo. Below is a green header with the text 'Calculation of umbilical catheter fixation'. Two buttons are present: 'PTNB ≤ 28 weeks' (highlighted in green) and 'PTNB > 28 weeks'. Below these are two input fields: 'U-N (cm)' and 'U-Ps (cm)'. Arrows from the photograph point to these fields. Below the fields, there are two text blocks: 'U-N: distance measured from the base of the UMBILICUS (U) to the LEFT NIPPLE (N)' and 'U-Ps: distance measured from the base of the UMBILICUS (U) to the upper edge of the PUBIC SYMPHYSIS (Ps)'.

Measurement 1:

U-N (cm): Distance measured from the base of the UMBILICUS (U) to the LEFT NIPPLE (N).

Measurement 2:

U-Ps (cm): Distance measured from the base of the UMBILICUS (U) to the upper edge of the PUBIC SYMPHYSIS (Ps).

Clinical Context

NeoFast processes these inputs utilizing the Gupta et al. (2015) anatomical reference methodology to instantly calculate the exact required length for both arterial and venous catheters.

Internal Trajectories & Navigation

Path 1 (UVC): Directly superior toward the liver/ductus venosus, aiming slightly toward the right shoulder.

Path 2 (UAC): Caudally toward the groin (internal iliac), then executing a hairpin turn superiorly up into the aorta.



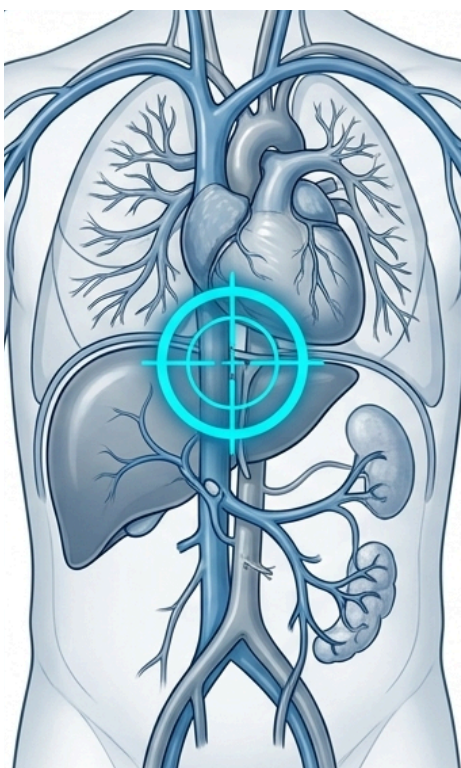
CRITICAL PROTOCOL:

The Golden Rule of Advancement. Lines can be withdrawn or replaced, but NEVER advanced once the sterile field is compromised.

UVC Radiological Bullseye

The Target:

T8-T9 (Inferior vena cava).



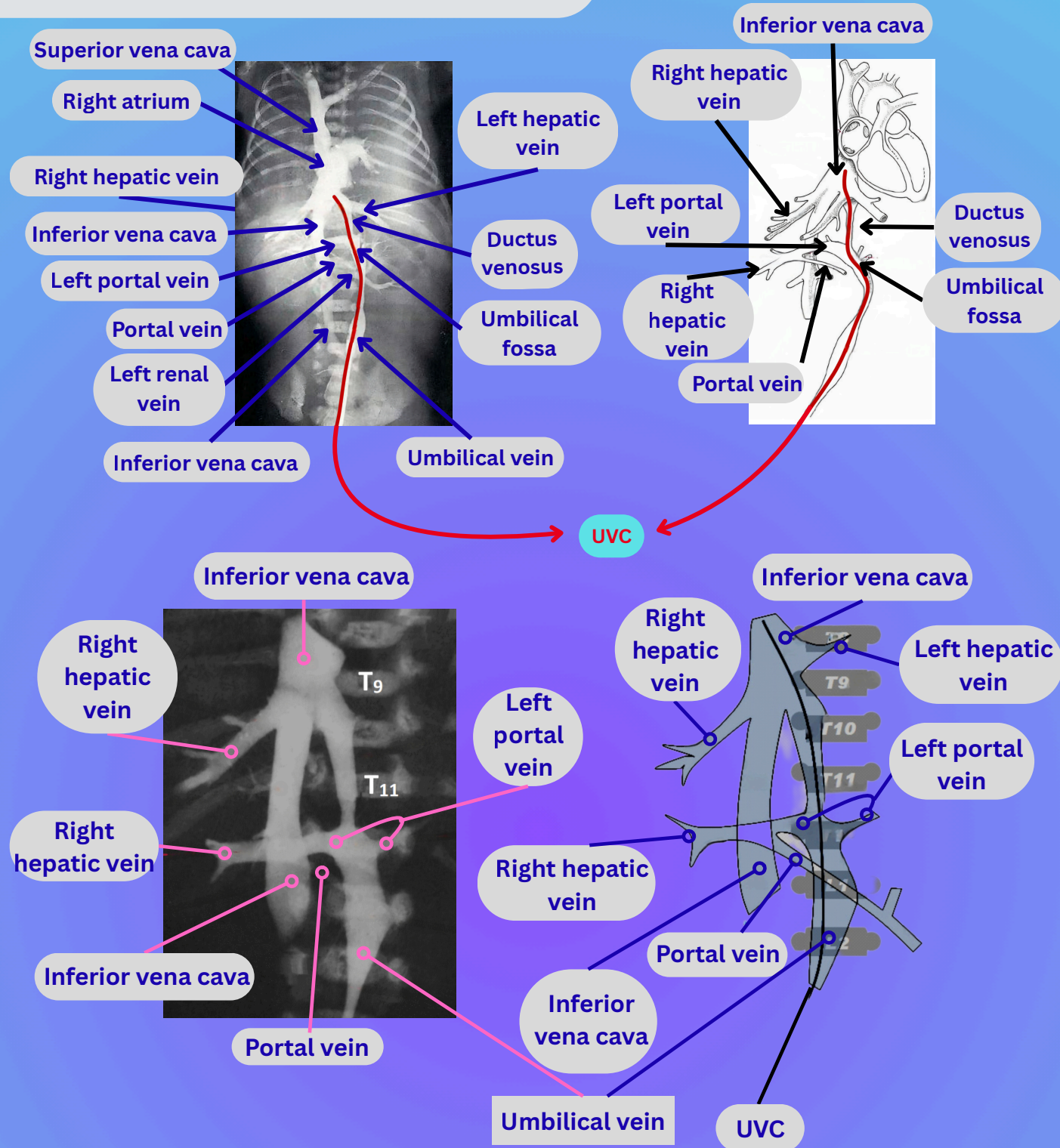
The Diagnostic Rule:

The catheter must be positioned above the diaphragm, strictly avoiding entry into the heart (outside the right atrium).

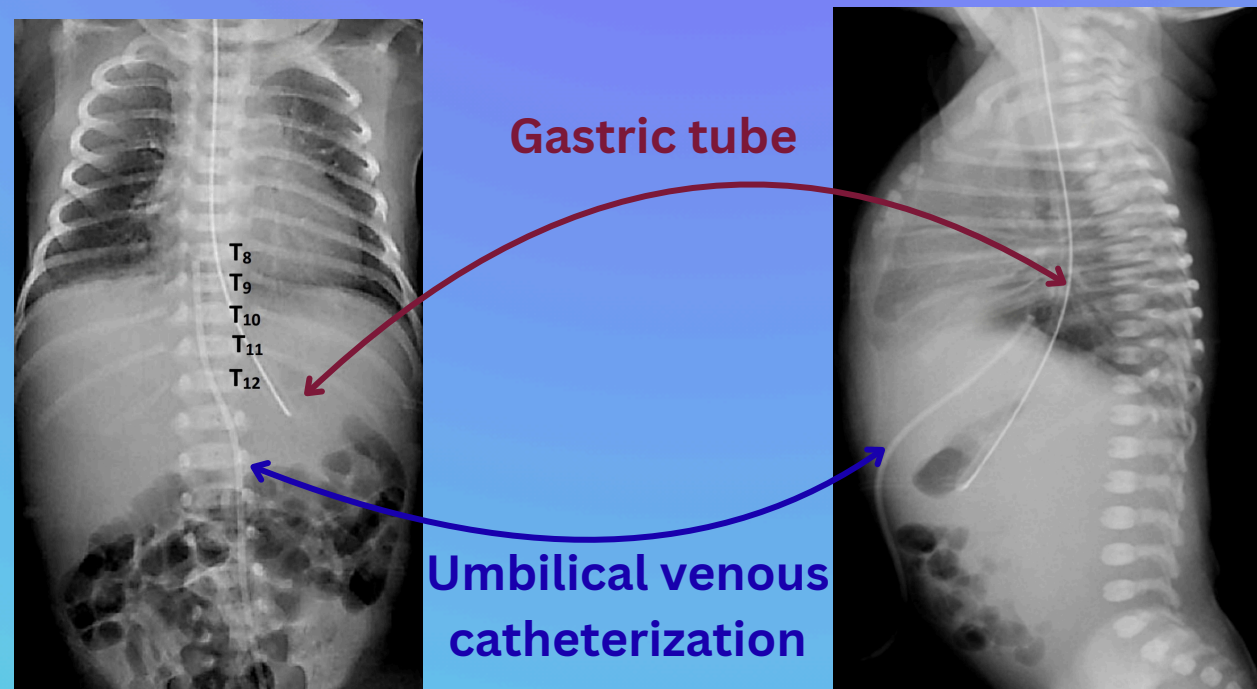
Corrective Actions:

- **If intracardiac:** Withdraw immediately. Never advance.
- **If low or intrahepatic (portal system):** Remove promptly. It cannot be reinserted.

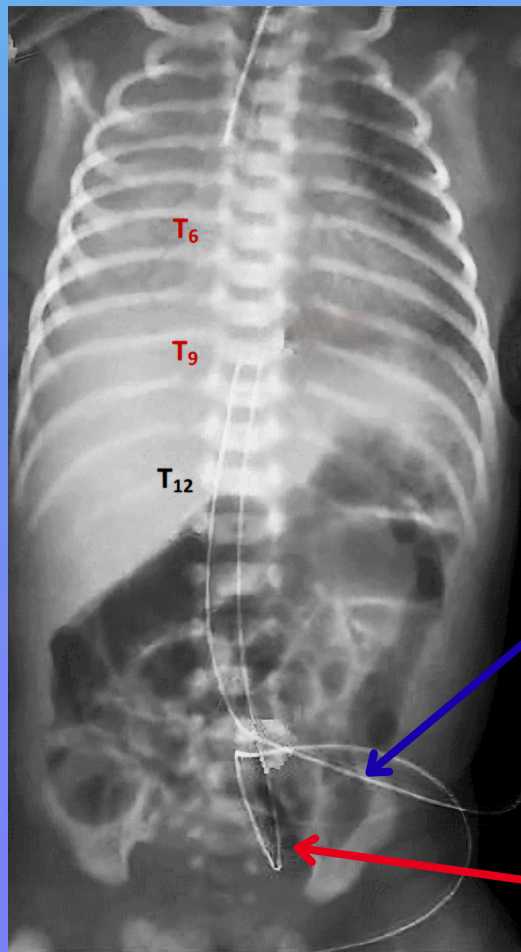
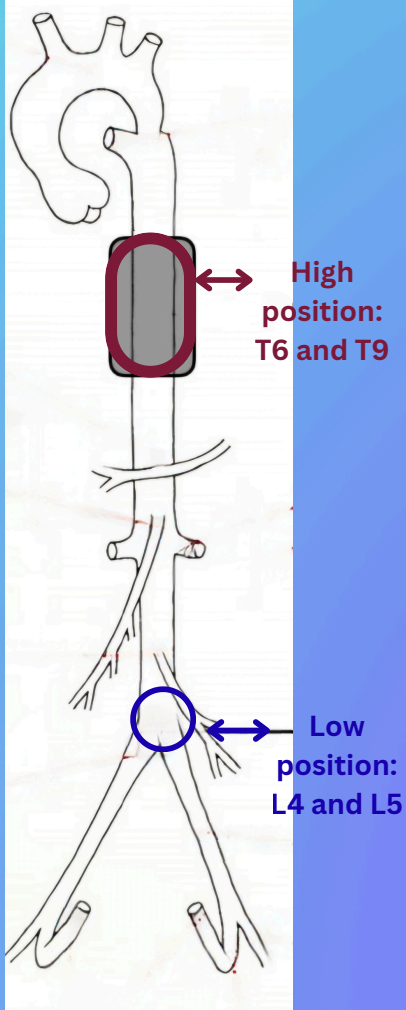
Umbilical venous catheterization



Radiological positioning of the CVU



UAC Radiological Bullseye



The Target:

High Target Position: T6 to T9.

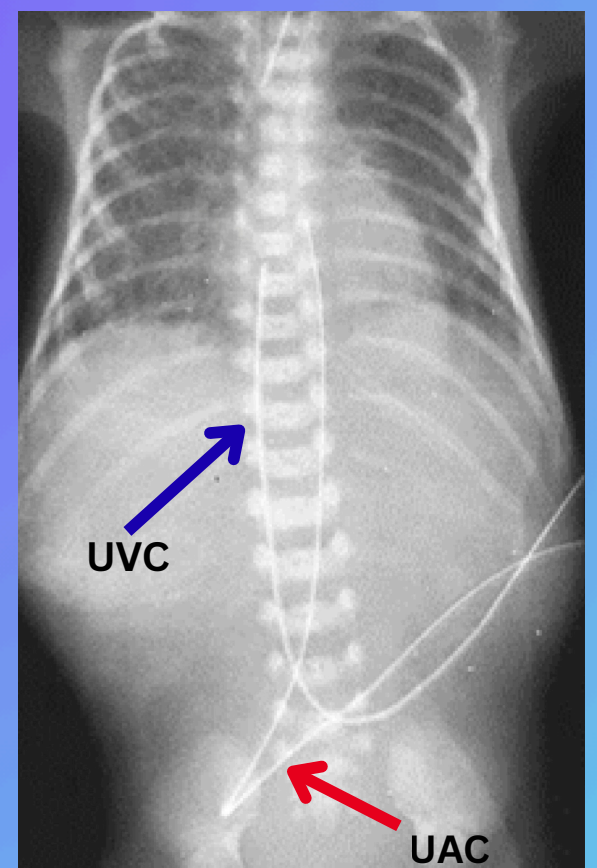
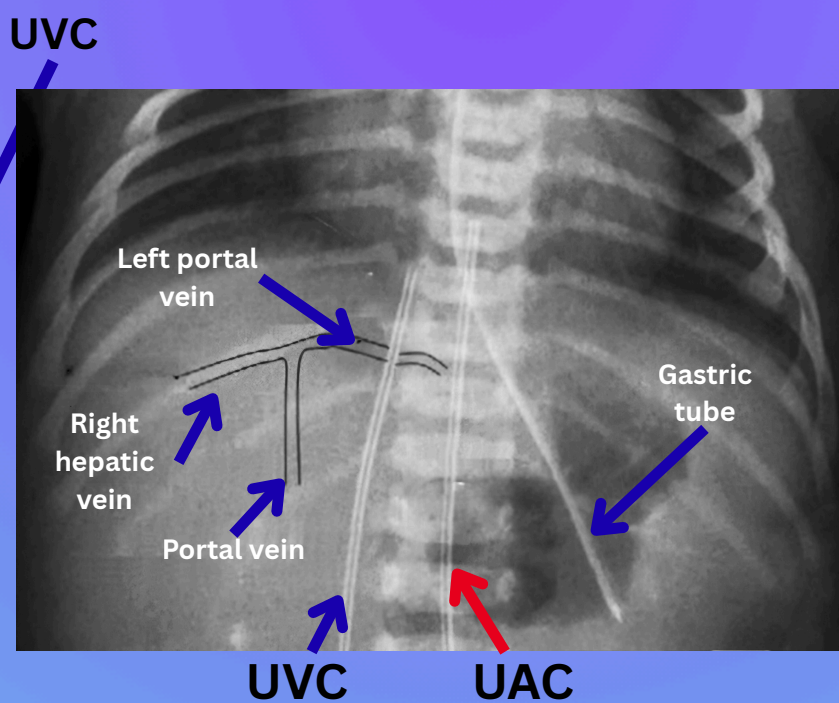
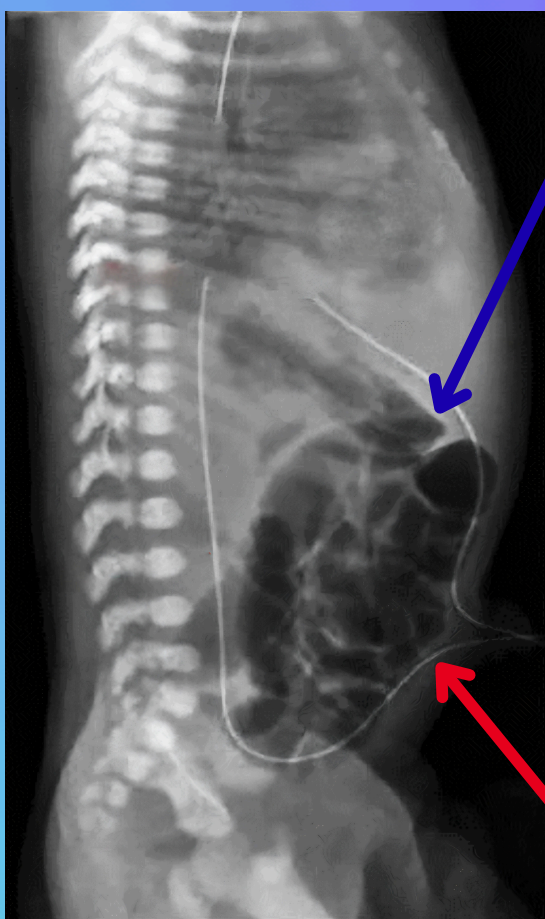
Low Target Position: L3 to L4 (or L4-L5).

The Diagnostic Rule:

Extends to the iliac artery before entering the aorta. Must be positioned outside the renal artery and other significant arterial branches (above the aortic bifurcation).

! Corrective Actions:

Remove immediately if mispositioned, or if clinical signs of cyanosis or pallor are noted in the lower limbs. (Maintained for up to 5 days max in absence of complications).



Vigilance: The Complication Watchlist

Cardiac Tamponade (Heart):
Rare but fatal complication if UVC advances too far and perforates the right atrium.



CLABSI (Systemic):
Central Line-Associated Bloodstream Infection requires strict daily maintenance checklists.



Ischaemia / Thrombosis (Legs):
Check lower limb perfusion (pallor, cyanosis) hourly for UACs.



If sudden discoloration does not rapidly resolve, remove UAC immediately.

Extravasation / Hepatic Necrosis (Liver):
Occurs if UVC is malpositioned low in the portal system.



The Four Golden Rules of Neonatal Access

Rule 1: Sterility is Absolute



Once the sterile field is broken, lines can only be withdrawn, never advanced.

Rule 2: Validate with NeoFast



Minimize human error during high-stress procedures by utilizing app-based fixation calculations.

Rule 3: Verify Before Infusing



Tip location **MUST** be assessed by X-ray or Point-of-Care Ultrasound prior to use (T8-T9 for UVC; T6-T9 or L3-L4 for UAC).

Rule 4: Monitor the Extremities



Hourly checks for **ischaemia** in **UACs** are non-negotiable.

Access is a privilege, treat every line with vigilance.

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