

## LABETALOL (Commentary)

**Measuring blood pressure**

Hypertension at any age is a medical emergency, but there is no doubt that its inappropriate management can make a serious situation much worse. The first need is to recognise it for what it is. The accurate measurement of blood pressure is still too uncommon a part of the basic 'work up' of any ill child – even a child with cardiac, respiratory, cerebral or renal symptoms.

Never rely on an oscillometric (Dynamap) measure of blood pressure – it can be seriously misleading in the neonatal period. Many studies have reported that it can give a misleadingly high reading when blood pressure is low. Fewer know that it can also give a reading that is misleadingly low when blood pressure is high (Pillossoff, *et al.*, 1985). Staff like these machines because their use takes up little time, and they display a lot of impressive looking figures. They can also be left on the child for hours on end generating figures that often vary over time more because the baby has intermittent periods of wakefulness and crying than because of any underlying change in the child's underlying condition.

Luckily systolic pressure is all that needs to be measured when looking for either hypotension or hypertension in infancy, and this can be determined with ease using any sensor capable of sensing arterial flow below a correctly sized and correctly applied upper arm cuff. The stethoscope is a poor tool for sensing flow reliably in a small baby, but a small Doppler flow probe is ideal (Hernandez, *et al.*, 1971) and quite inexpensive. The point at which a pulse oximeter first picks up the characteristic pulse waveform as the cuff is deflated provides an equally reliable measure of systolic pressure (Langbaum and Eyal, 1994) and it is relatively easy to take serial readings this way without disturbing the child.

Even here however the words "correctly sized cuff" are critical. Many of the official semi-disposable cuffs that come with oscillometric machines are not very satisfactory. It is essential for the bladder to almost completely surround the arm, and important for the bladder to be as wide as realistically possible. It is normally said that the width of the bladder should equal between 40% and 65% of the circumference of the upper arm, but there may well also be an absolute minimum width below which readings become unreliable. The circumference of the upper arm is often much the same as the length of the humerus, so a cuff of adequate width will often reach almost from the shoulder to the elbow. Don't struggle to leave the elbow exposed so that flow can be assessed there – it is better to use a really wide cuff and to sense flow, either at the wrist with a Doppler probe on the radial artery, or using an oximeter probe strapped to the hand.

**Managing hypertension**

The first overriding imperative is to do no harm. Five per cent of babies will, by definition, have a blood pressure above the 95<sup>th</sup> centile. Just because they are statistically hypertensive this does not make them clinically hypertensive. In many babies with mild hypertension the blood pressure will come down on its own without intervention. The raised blood pressure often seen during treatment with dexamethasone is a case in point. Serious hypertension (a systolic pressure more than 15 mm Hg above the 95<sup>th</sup> centile with the child quiet or asleep) is, however, a medical emergency. Most of these babies will have renal disease and the high blood pressure will be driven by renin production. Vascular damage due to renal vein thrombosis, or to silent emboli from an indwelling aortic catheter, can often be the precipitating problem. In other babies catecholamines from a neurogenic tumour drive the hypertension. Others babies will have coarctation. In a few no explanation is ever found.

If a child who has been normotensive recently presents with acute hypertension it is safe, and indeed important, to reduce the blood pressure quickly. Often, however, it is far from clear how long the child has been hypertensive. Here blood pressure must be reduced slowly. Chronic hypertension leads to a protective cerebral vasospasm which will only remit slowly over 2-3 days: too rapid a fall in blood pressure can result in acute under perfusion of the brain, presenting clinically as fitting, encephalopathy or sudden blindness. Labetalol, a combined alpha and beta blocker, is the drug of choice because it has a relatively short half life and the dose given can be titrated against the response achieved as outlined in the main monograph.

It is however, **essential** to measure systolic blood pressure at least twice an hour to start with in order to ensure that the fall in pressure is gradual. It is all too easy to replace dangerous hypertension with dangerous hypotension, and this hazard has been documented many times when attempts have been made to initiate control using an oral drug. The neonate in particular can respond very unpredictably to even a small test dose of captopril, and even nifedipine (now the most popular drug managing children with sustained hypertension) is not without its dangers. Oral treatment should only be introduced and IV treatment gradually tailed off once systolic pressure is back within normal limits.

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