

Serum progesterone assay: a most sensitive marker for a failing pregnancy

Abstract

The common practice of using a single serum progesterone value to predict the outcome of a pregnancy in its early stages is flawed. Much has been written about the predictive value of a single serum progesterone value of 20nmol/l (6.2ng/ml). Our case reveals that a single serum progesterone value may not be as sensitive in predicting a pregnancy outcome as the trend in two successive values.

Compared to the more widely used serum Beta hcg; the serum progesterone trend is more sensitive, results in an opportunity for earlier interpretation of the data and more focused management plans and is no more expensive than the more commonly used serum beta hcg.

Case report

A 26year-old, Gravida 3 para 1+1 patient presented to the accident and emergency department with a positive urine pregnancy test. A serum beta-hcg was taken and the patient was examined but found to have no clinical signs of an ectopic pregnancy. She was discharged and advised to return in 48hours for a repeat serum beta hcg. The value of her serum beta-hcg on presentation on August 4, 2015 was 843.1miu/ml, a repeat 48hours later was 1876miu/ml, an increase of in excess of 122%. A serum progesterone on August 4 was also requested and the value was 52.9nmol/L. Interestingly a repeat serum progesterone 48 hours later showed a decline in serum progesterone to 47.34nmol/L, surely this is not in keeping with normal physiology. A repeat serum beta hcg 7 days later on the 15/08/15 was 11, 809miu/ml whereas the serum progesterone was 37.26nmol/L. The patient had both a transabdominal and transvaginal scan on the 15/08/2015 and an empty uterus with a prominent endometrial reaction was identified, at the time the patient had little mild lower abdominal pains and no free fluid in the pouch of Douglas.

The following morning on the 16 /08/2015, the patient was pain free and she had a repeat abdominal and transvaginal scan which again revealed an empty uterus with a less prominent endometrial reaction, a left sided complex mass and no free fluid in the Pouch of Douglas. Dark blood was noted on the transvaginal probe, although the patient did not complain of any vaginal loss.

In light of the findings on ultrasound scan, the patient's bloods namely, her serum beta-hcg and progesterone levels were repeated, this revealed a beta-hcg of 9220miu/ml, a drop of about 22% in less than 24hours and a further decline in serum progesterone to 27.890nmol/L. A diagnostic laparoscopy was performed. At laparoscopy, there was a 2cm by 3cm left ampullary ectopic gestation; there was no free fluid in the pouch of Douglas. The patient had a laparoscopic left salpingectomy and she was discharged home the following day.

Discussion

Progesterone, a hormone, is thought to play a crucial role in the maintenance of pregnancy. In early stages of pregnancy, the corpus luteum (yellow body) is thought to be its primary source. This role is eventually assumed by the placenta as the embryo/foetus develops. It

Volume 8 Issue 1 - 2018

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Received: January 09, 2018 | **Published:** February 05, 2018

would therefore seem that for a developing pregnancy to be sustained, the progesterone titres should increases the pregnancy progresses. We were therefore concerned by the declining serum progesterone levels in an early pregnancy despite a continuing rise in the serum beta-hcg values beyond the critical 66% levels expected within 48 hours. It is noted that the National Institute of Clinical Excellence (NICE) does not recommend the simultaneous use of serum beta hcg and serum progesterone in the management of a pregnancy of unknown location. This clinical scenario, however, may suggest that the declining serum progesterone levels are a more sensitive marker of a failing pregnancy than serial serum beta-hcg values. Simultaneously, It will be noted that a single progesterone value as an indicator of foetal wellbeing could be misleading. Contrary to Mc Cond ML who contends that a serum progesterone greater than 50nmol/L tends to be found in a viable pregnancy.

The serum progesterone value that is regularly quoted to suggest foetal wellbeing is a value greater than 50nmol/L, in our case the first recorded serum progesterone level was 52.9nmol/L. This had the effect of providing the clinician with false reassurance and gave him a tool which could have been used to inadvertently misguide the patient. Interestingly, repeating the serum progesterone in 48hours revealed a decline in the serum progesterone levels. In our patient, it will also be noted that whilst the serum beta hcg value continued to rise even some ten days after the initial contact with the first recorded decline at day 11 from presentation, the progesterone level never fluctuated but showed a continuous decline. This, though a single case, a declining serum progesterone level is probably a more sensitive marker for a failing pregnancy than serial serum b-hcg. It also strongly suggests that the 66% or greater increase of the serum beta-hcg over 48 hours is not as sensitive as previously thought in ruling out a failing pregnancy. In our case the serum beta hcg increased in excess of 122% within 48hours of presentation. Caution is therefore advised in the interpretation of a 66% or greater rise in serum b-hcg within a 48hour epoch.

We recognise that this is a case report with its known inherent weaknesses and we are reluctant in making strong claims for the preference of repeat progesterone assays over serial serum beta-hcg in assessing foetal wellbeing. We are, however, left to ponder whether a decline in the serum progesterone titre which can be realised as early as 24hours from the initial assay is not a sufficiently sensitive biomarker

to predict pregnancy outcome and therefore may provide clinicians with a useful tool in both counselling and informing patient's care.

The more widely used practice of serial serum beta hcgtiters may be much less sensitive and the difference in cost is a negligible 5pence (cost of kit progesterone £3.12, labour £3.18, total: £6.30; for serum beta hcg: cost of kit £3.07, labour £3.18 cost £6.25). Yet the use of progesterone assay as a marker for a failing pregnancy has been virtually replaced by the serum beta hcgtiters. This case report suggests that the decline is sufficiently rapid to allow the successive assays to be done at 24hour intervals. It simultaneously destroys the previously held view that much about foetal wellbeing is gained from a single serum progesterone value. The trend between successive assays is arguably a stronger predictor of foetal status.¹⁻⁵

Acknowledgements

None.

Conflict of interest

The author declares no conflict of interest.

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