Second Trimester Maternal Serum Screening (MSS) for Down Syndrome: A 5 Year Review

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INTRODUCTION

Second Trimester MSS for Down Syndrome was introduced to KK Women's & Children's Hospital in 1999 and has been part of the antenatal screening tests offered since. It is offered to all pregnant mothers between 14 to 22 weeks gestation.

OBJECTIVE

To determine the screening performance of the MSS programme in KKH from March, 1999 to February, 2004.

MATERIALS AND METHODS

Maternal serum was analysed for both maternal serum alpha-fetoprotein (AFP) and free-beta human chorionic gonadotrophin (β-hCG) (adjusted for maternal weight) and converted to multiples of the unaffected median (MoM) based on locally regression median data for each of the analytes. The gestational age was based on ultrasound measurements. The risk was computed based on the algorithm by Wald, 1998. All mothers with a term risk of 1:250 or higher for Down Syndrome (T21) or 1:334 or higher for Edward Syndrome (T18) were offered amniocentesis. All AFP MoM > 2.0 were referred for a detailed ultrasound scan. Follow-up on pregnancy outcome was complete for 92.3% of the cases.

FINDINGS

The cohort of 16,653 singleton pregnancies comprised 72.9% Chinese, 11.6% Malays, 10.0% Indians and 5.5% Other Races. The median maternal age was 30.2 years old (ranging from 14.7 to 51.9 years old). 7.7% of the mothers were ≥ 35 years at delivery. In 1995 at KKH, 16.7% of mothers were ≥ 35 years.The prevalence of T21 was 1 in 833 pregnancies. The Screen Positive Rate (SPR) for T21 was 6.1%, Negative Predictive Value (NPV) was 99.96%, and the Detection Rate (DR) was 65.0% The Positive Predictive Value (PPV) was 1 in 78 (1.3%). All Low Risk mothers delivered normal-looking babies. There were seven T21 pregnancies giving a False Negative Rate of (FNR) 1 in 2,234 (0.04%). Four of the seven T21 pregnancies had karyotyping done as fetal abnormalities/ markers were found on subsequent routine ultrasound scan. All proceeded to a mid-trimester pregnancy termination. The other 3 live Down' births had no structural abnormalities at birth. The SPR for Open Spina Bifida (OSB) was 3.0%, its DR was 92.3% with a PPV of 1 in 42 (2.4%). The SPR for T18 was 0.3% with a DR of 40% and a PPV of 1 in 23 (4.3%).

Graph 1 shows Age Distribution in Sample Population

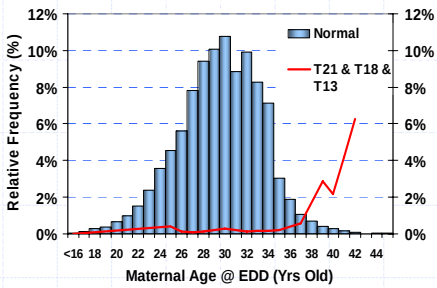

Table 2 shows the data of 7 False Negatives

FINDINGS (contd)

Table 3: Risk Performance

Screen	Age	Positive ≥ 1:250	Negative < 1:250	Total
Down	< 35 yrs	9	6	15
	≥ 35yrs	4	1	5
	Sub Total	13	7	20
Not Down	< 35 yrs	738	14,618	15,356
	≥ 35yrs	263	1,014	1,277
	Sub Total	1,001	15,632	16,633
Total		1,014	15,639	16,653

CONCLUSIONS

With maternal serum screening alone, we had a detection rate of 65% of Down Syndrome pregnancies in a fairly younger subset of mothers seen at KKH at a screen positive rate of 6.1%. In combination with a routine 20 week screening obstetric ultrasound scan, the Detection Rate was 85%. Finally, one of the three T21 live births had an increased Nuchal Translucency (NT) at 11 weeks but had declined amniocentesis. It is expected that with the introduction of routine first trimester screening program in an integrated setting, the detection rate would be increased without a corresponding increase in the procedural rate. It is vital that high quality outcome data for such audit is available to confirm this.

REFERENCES

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No	Race	Age @ Edd	MA Risk	AFP MoM	ß- hCG MoM	MSS Risk	Ultrasound Scan Results	MSS & Ultrasound Scan Risk	Status
1	M	25.2	1:1371	0.51	1.52	1:476	No NT measured. Screening Scan showed Diaphragmatic Hernia, Stomach bubble is in Left Chest, Heart pushed to Right side, absent Nasal Bone, slight increased Amniotic Fluid.	Very high	Terminated
2	I	30.2	1:940	0.68	1.82	1:412	NT=1.5mm @ 12 weeks (pre-FMF accrediidation ad-hoc NT scan)*. Screening Scan showed No abnormalities	(1:824)*	Delivered with Mild Turbulence in Right & Left pulmonary arteries, Patent Foramen Ovale (PFO)
3	C	25.5	1:1353	0.90	3.66	1:259	NT 2..6 mm @ 11 weeks. Screening Scan showed No abnormalites	1:340	Delivered with Moderate size Atrial Septal Defect (ASD), PFO, Patent Ductus Arteriosus
4	C	30.1	1:953	0.54	1.66	1:311	No NT Measured. Screening Scan showed Ventricular Septal Defect, Pulmonary Artery Stenosis, overiding Aorta, 2 echogenic foci in (Left) Ventricle of Heart, prominent both Renal Pelvis 4+mm	Very high	Terminated
5	C	31.5	1:798	0.63	0.73	1:1725	NT=1.3mm @ 11 weeks. Screening Scan showed Severe hydrops, Bilateral Pleural Effusion, ? Club Right Foot, hypoplastic middle Phalanx 5th Finger Right Hand	Very high	Terminated
6	C	33.9	1:538	1.12	1.49	1:1204	NT = 1.7mm @ 12 weeks. Screening Scan showed echogenic Bowel, echogenic foci (Left) Heart, Bradycephaly, short Mandible 2.8mm, 2 echogenic foci in (Left) Ventricle of Heart	Very high	Terminated
7	C	35.1	417	1.11	0.66	1:4880	No NT measured and Screening Scan showed No abnormalities	1:9760	Delivered with small ASD/PFO