OSTEOPENIA OF PREMATUREITY, CAN WE PREDICT IT? CAN WE STOP IT?

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Introduction

Very low birth weight (VLBW) infants are at risk of osteopenia of prematurity (OOP) and related skeletal fractures.^{1,2} Improved nutritional management in recent years should reduce the incidence of OOP. However, increased use of medications such as postnatal steroids, may have had a negative effect on bone health.³

It can be difficult to detect early signs of OOP and often the process is quite advanced by the time X-ray changes become evident.

Our aim was to examine which biochemical markers best predicted radiologically significant OOP and thus better target our treatment and follow up in this vulnerable population.

Methods

We performed a retrospective review of all X-rays carried out on VLBW infants over a 5-year period in a tertiary neonatal centre. We also reviewed laboratory results in these babies. We compared the biochemical markers of OOP in those with and without radiological signs of OOP. We defined OOP radiologically as infants with Stage 1 and above X-ray changes as per Koo et. al.⁴

Results

Of the 609 VLBW infants included in the study, 5.9% of these babies showed radiological evidence of OOP.

The average gestation of babies born with OOP was 26+3 weeks and it took on average, 6.5 weeks for radiological evidence of OOP to be seen.

Table 2 compares the various biochemical markers associated with metabolic bone disease in the two groups. The highest alkaline phosphatase measurement recorded, duration of raised alkaline phosphatase and duration of low phosphate all were statistically significant predictors of OOP in our study.

Results

	Radiological evidence of OOP n=36	No radiological evidence of OOP n=573	Total population n=609	p-value
Birth Weight (grams)	720 (630, 950)	1117 (860, 1315)	1100 (840, 1300)	<0.001
Length of Stay (days)	78.5 (55, 97)	38 (23, 56)	40 (34, 58)	<0.001
Number of X-Rays	22 (13, 35)	5 (2, 11)	5 (2, 12.5)	<0.001
Number of Chest X-Rays	15.5 (9, 26)	4 (2, 9)	4 (2, 9)	<0.001

Table 1
Comparison between babies with and without radiological evidence of OOP
Means and (interquartile ranges) presented

Table 1 illustrates that the babies who showed evidence of OOP were, as expected, smaller and had longer hospital stays.

Results

	Radiological evidence of OOP n=36	No evidence of OOP n=573	p-value
Highest Alkaline Phosphatase (IU/l)	634 (468, 741)	452 (348, 588)	<0.001
Number of Recordings with Alk Phos >500 IU/L	3 (0, 6)	0 (0, 2)	<0.001
Time with Alk Phos >500 IU/L (days)	8.5 (0, 29)	0 (0, 2)	<0.001
Number of Recordings of Alk Phos >900 IU/L	0 (0, 0)	0 (0, 0)	0.916
Time with Alk Phos >900 IU/L (days)	0 (0, 0)	0 (0, 0)	0.918
Lowest Phosphate (mmol/l)	1.42 (1.05, 1.58)	1.39 (1.15, 1.65)	0.48
Number of Recordings with Phosphate <1.8 mmol/l	6 (3.25, 8)	4 (1, 7)	0.011
Time with phosphate <1.8 mmol/l (days)	16 (3, 30.75)	5 (1, 16)	0.001
Lowest Corrected Serum Calcium (mmol/l)	2.21 (2.05, 2.32)	2.24 (2.16, 2.36)	0.56
Lowest Vitamin D (nmol/l)	44 (30.25, 57.75)	54.5 (28.75, 91.5)	0.0635
Highest Parathyroid Hormone (pg/ml)	12.5	23.5 (10.9, 52.9)	0.800
Lowest Magnesium (mmol/l)	0.81 (.74, .89)	0.86 (.80, .97)	0.007

Table 2
Comparison of babies with and without radiological evidence of OOP
Means and (interquartile ranges) presented

Discussion

We looked at several different markers of metabolic bone disease to see which best predicted radiological evidence of OOP. Of these, the time duration with elevated alkaline phosphatase and the time duration with low phosphate were strong predictors of OOP. Using this information it can be concluded that promptly correcting high alkaline phosphatase and low phosphate should have an impact on reducing OOP in these babies.

This emphasises the need to regularly monitor the markers of bone health in this population and to treat abnormal results swiftly. There is an opportunity to improve the bone health of the smallest babies with careful monitoring and management.

References

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