THE ETIOLOGY AND PATHOGENESIS OF INFANTILE IDIOPATHIC SCOLIOSIS

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Idiopathic Scoliosis

Infantile	:	Birth - 3 yrs
Juvenile	•	3 - 10 yrs
Adolescent	:	10 - maturity



Early Onset Idiopathic Scoliosis

Infantile : 140 pts Juvenile : 160 pts

Sex Ratio

- Infantile M:F equal
- After age 3yrs gradual change
- By age 10yrs
 Majority girls 4 : 1



Curve Side

Infantile

 Left sided curves
 2:1

 After age 3yrs

 gradual change
 By age 10yrs

Right sided curves 8:1



Progressive and Resolving

- Infantile 34% resolved diagnosed first year life
- Juvenile
 Only one resolved



All of these features suggest that infantile idiopathic scoliosis is very different from juvenile and adolescent idiopathic scoliosis with a different etiology and prognosis

Infantile Idiopathic Scoliosis



What is the likely etiology and prognosis for such a curve ?

Family Surrvey of Infantile Idiopathic Scoliosis Edinburgh

Aetiology is multi-factorial

"Genetic tendency to develop the deformity, but this is was usually insufficient by itself and required to be triggered by other adverse factors that may be medical or environmental" Wynne-Davis JBJS 1975

What are these adverse triggering factors ?

- They must act after birth because the scoliosis is not present at birth
- The balance between the genetic and triggering factors are likely to vary between infants

A Clue to Triggering Factors





Close association between the presence of developmental plagiocephaly and the onset of infantile idiopathic scoliosis



Normal Children Without a Scoliosis

- Developmental plagiocephaly is not present at birth
- However it develops in 28% of normal infants between 6 weeks and 6 months of life
- Immobile or floppy children
- Resolves by 2 yrs



Plagiocephaly In Infants Who Develop Infantile Idiopathic Scoliosis

- Developmental plagiocephaly is again not present at birth
- It develops in 96% infants who also develop an infantile idiopathic scoliosis
- Both deformities occur in first few months of life
- The side of the plagiocephaly corresponds to convex side of scoliosis



M McMaster JBJS 1984

This close association between the time of onset as well as the side of the deformity of both developmental plagiocephaly and infantile idiopathic scoliosis suggests a common pathogenesis with immobility and posture in the newborn being a major contributing factor



Additional Factors Contributing to Immobility in Newborn of Patients who Develop Infantile Idiopathic Scoliosis

- Prematurity
- Low birth weight
- Mild mental retardation
- Older mothers
- Poor homes

Wynne-Davies JBJS 1968

What is the cause of the scoliosis?







Resolving Scoliosis

- Immobile infants who becomes active more quickly
- Results in only mild moulding of the chest
- Very little vertebral rotation
- Weak genetic factor
- Scoliosis usually resolves by age 2yrs as infant becomes more mobile



Progressive Scoliosis

- Longer lasting immobility
- Results in marked moulding of the chest
- More severe vertebral rotation
- Associated with a significant genetic factor
- Balance is tipped



Infantile Idiopathic Scoliosis Curve Patterns: 140 patients (Edinburgh)

Thoracic84% (118pts)63% progressedThoraco-Lumbar7% (10pts)Double T:L9% (12pts)all progressed

Rib Vertebral Angle Difference



- Resolving Curve RVAD < 20 deg (80%) Rib Head Phase I
- Progressive Curve RVAD > 20 deg (80%) Rib Head Phase II

M Mehta JBJS 1972



Resolving Scoliosis (36%)

- All single thoracic curves
- RVAD < 20° (79%)
- Rib heads all Phase I
- Scoliosis usually < 50°
- Majority resolve by 1 to 2 years



Resolving Scoliosis





Progressive Thoracic Scoliosis

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1+0 **RVAD** 5+1 <mark>> 20</mark>° (67%) **Rib heads** 23° Phase II 85° Majority progress very rapidly RVAD +24

Prognosis of Infantile Idiopathic Progressive Thoracic Curves

Maximum Angle Recorded 107 Children Before Treatment







112°



Effect on Respiratory Development

- By age 10 yrs
 - majority > 70° many > 100°
- Severe rigid scoliosis
- Horrendous deformity with constriction the of rib cage from an early age
- Cor pulmonale
- Early death





Double Scoliosis Thoracic and Lumbar (9 per cent)

- Develop later than a single thoracic curve
- RVAD < 20°
- All progress but more slowly
- Spine remains balanced



CONCLUSION

- The term infantile "idiopathic" scoliosis should not be used
- Infantile "developmental" scoliosis is probably a better description

KEY TO SUCCESSFUL TREATMENT

- Early diagnosis
- Anticipation (RVAD)
- Control the deformity deformity
- If possible prevent increasing respiratory impairment



Thank You

