

# The development of spinal deformities following open heart surgery for congenital heart disease

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# INTRODUCTION

CHD at increased risk for scoliosis

– 2-31%

– No sex predilection

– Multifactorial

- Thoracotomies (Bisgard)
- Sternotomy (Ruiz- Iban)
- Combined thoracotomy and sternotomies ( Herrera-Soto et al.)
- Cyanosis-producing condition
- Heart size



# INTRODUCTION

- Scoliosis in patients post sternotomy has been previously reported to be about 26%
  - Similar to thoracotomies
- The incidence of hyperkyphosis after OHS has been recently found to be about 21%
- Nothing reported regarding kyphosis after a thoracotomy



# PURPOSE

- Determine the incidence of scoliosis and kyphosis after OHS
- Compare the different OHS treatment modalities
- Identify and typify any risk factors leading to increased curve severity



# MATERIALS AND METHODS

**221 patients with OHS (132 M & 89 F)**

- **114** sternotomy only
- **68** thoracotomy and sternotomy
- **39** thoracotomy only
- Mean follow-up of 13 years
  - Min 3 year follow-up
- **No** congenital vertebral anomalies
- **No** scoliosis prior to first OHS procedure



# Results

- Fifty-nine patients presented scoliosis (27%)
  - 33 female and 26 male
- There was a **similar incidence** of scoliosis between the OHS groups (26-27%)



# Results

- 18 presented moderate to severe scoliosis
  - 39% with moderate to severe scoliosis presented with hyperkyphosis (>40 degrees)
  - All patients with severe scoliosis (22% of those with scoliosis) underwent PSF
    - Nine female and 4 male



# Results

- Forty patients (18%) presented with hyperkyphosis
- **Only 1/39** with hyperkyphosis had a thoracotomy (**2.6%** of thoracotomy patients)
- The remaining 39 patients underwent a sternotomy or combined procedures
  - This represents **21%** for each group of patients
  - Statistically significant



# Results

- **No difference** in those with cyanotic condition or not and the development of scoliosis or kyphosis

## **Except in the combined group**

- Higher incidence in cyanotic conditions



# Results

- **No difference** between those with and without scoliosis and the age at the first procedure was found
- Patients with multiple procedures were not at increased risk of deformity



# Discussion

- There is an increased incidence of scoliosis in CHD patients especially of moderate and severe scoliosis
- No relationship between the presence of cyanosis, multiple procedures or age at surgery as risk factors
- Similar gender predilection
  - Females needed surgery more often



# CONCLUSIONS

- CHD are more than a 10X at risk for scoliosis
- Sternotomy patients have similar risk of developing scoliosis as thoracotomy patients
- Increased risk to develop sagittal deformity in patients undergoing sternotomy



# Clinical importance

- **Sternotomy**

- May affect coronal alignment as thoracotomy does
- Shown to affect sagittal alignment
  - Not seen in thoracotomies
- It is important for continued monitoring of spinal deformities as 80% of our severe curves developed before the age of nine



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