The Right Paratracheal Stripe in Children

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Abstract. The width of the right paratracheal stripe (RPS) has been established in normal adults but not in normal children. The thymus and great vessels are relatively larger in children than in adults and could obscure or widen the RPS. We found that obscuration does occur and, therefore, the RPS is less often measurable in children than in adults. Widening by the thymus and great vessels, however, does not occur. The width of the RPS in normal children, 0.5 to 3.0 mm, is slightly less than in adults. From this study of normal children and our subsequent experience with pediatric patients, we conclude that in a child an RPS 4 mm or wider is reliable evidence of disease affecting the trachea, mediastinum, or pleura.

Key words: Right paratracheal stripe - Mediastinum - Anatomy - Pleura - Thoracic structures

The right paratracheal stripe (RPS) is the thin stripe of water density seen on frontal chest radiographs between the tracheal air column and the adjacent right lung (Figs. 1 and 2). One of us has found that in adults an RPS wider than 4 mm is reliable evidence of disease [1], and subsequent experience has suggested that this criterion of disease is valuable in children as well. However, the width of the RPS has not previously been determined in normal children. Because the thymus and great vessels contribute proportionally more to the width of the superior mediastinum in children than in adults, these structures might obscure or widen the RPS. We wished to ascertain what percentage of normal children have a measurable RPS and, when it can be measured, what the range of its width is. Further, we wished to investigate the significance of a wide RPS in children.

The anatomy of the right paratracheal region must be understood to avoid misidentifying the RPS (Fig. 2). The medial edge of the right lung along the upper mediastinum can be tangent to the frontal x-ray beam in as many as five places and can thus form potentially five lines on the radiograph - although it is unusual to see all five lines on a chest radiograph of a child. The lateral margin of the RPS must be distinguished particularly from the paraspinous line, from bone margins, and from the superior vena cava. Misidentification of any of these two lines as the lateral margin of the RPS can cause a false interpretation of widening of the RPS (Fig. 1).

Part I: Normal Values

Materials and Methods

As described previously for adults [1], the width of the RPS was measured on posteroanterior chest radiographs from the tracheal air column to the overlying right lung. This measurement was made at a level 2 cm above the superior extent of the azygos arch. If no azygos arch was visible, the level used was 2 cm above the superior margin of the right main bronchus at its origin. The width was measured as closely as possible to this level, and always within 1 cm above or below it. If the width could not be measured within this range it was considered unmeasurable. Widths were determined to the nearest 0.5 mm.

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The RPS was measured in two groups of normal children. **Group 1** consisted of 50 5-year-old children who had routine pre-school chest radiographs. **Group 2** consisted of 100 patients, 5 months to 15 years old, who had screening chest radiographs taken at our institution from July 1976 through March 1977. None of these patients had chest-related disease and none demonstrated abnormal findings on the chest radiograph.

Each of the 50 radiographs of Group 1 was further assessed to determine whether the patient was positioned perfectly straight or turned slightly left anterior oblique or right anterior oblique.

**Results**

In **Group 1**, the width of the RPS was measurable on 19 of the 50 radiographs. In **Group 2**, the RPS was measurable in 38 of the 100 radiographs. In **Group 1**, the widths ranged from 1.5 to 3.0 mm inclusive. The mean was 2.29 mm and the standard deviation was 0.38 mm. In **Group 2**, the widths ranged from 0.5 mm to 3.0 mm. Mean width was 1.85 mm and the standard deviation was 0.65 mm.

In **Group 1**, 9 radiographs were judged as showing the patient slightly left anterior oblique (LAO) in position. Fourteen showed the patient to be slightly right anterior oblique (RAO), and in the remaining 27 the patient was perfectly straight. On only 1 of the 9 LAO radiographs was the RPS measurable, whereas it was measurable on 10 of the 27 straight radiographs and 8 of the 14 RAO radiographs. This decreased measurability of the RPS in the LAO position was statistically significant ($p < .05$). The apparent increased measurability with RAO positioning was not statistically significant.

**Part II: Widened RPS**

**Materials and Methods**

Because an RPS width of more than 4 mm was found to be evidence of disease in adults [1], one of us subsequently