

Spinal Curves And Scoliosis



©2009 ASRT. All rights reserved.

Spinal Curves and Scoliosis

SUSAN M. ANDERSON, M.A.Ed., R.T.(R)

Scoliosis, an abnormal side-to-side curve of the spine with associated vertebral rotation, affects as many as 4% of all adolescents. Several different categories of scoliosis exist, and treatment can range from observation and follow-up to bracing and surgical correction. This article discusses special imaging series for scoliosis and emphasizes the need for proper radiation protection techniques for patients with scoliosis, most of whom are girls in their early to mid-teens.

This ASRT Directed Reading Classic was originally published in Radiologic Technology, September/October 2007, Vol. 79/No. 1. Visit www.asrt.org/store to purchase other ASRT Directed Reading Classics.

Note: Lateral images are displayed according to institutional preference, which may vary by institution.

After completing this article, the reader should be able to:

- Identify and label the parts of a vertebra and describe the differences between the vertebrae in each section of the spine.
- Distinguish between and describe the appearance of normal vs abnormal spinal curves.
- Explain the 3 treatment options for scoliosis and describe how a treatment is chosen.
- Discuss the role of medical imaging in the diagnosis and treatment of scoliosis.
- Summarize basic procedural differences for radiographing the spine in patients with scoliosis.
- Identify radiation safety methods necessary for imaging young scoliosis patients.

The spine, or vertebral column, is located centrally and posteriorly in the body. It is an important part of the body and has many functions. The spine is necessary for providing structure, flexibility, support and movement for our bodies. It acts as an attachment site for the muscles of the back, as well as the posterior ribs.¹ The spine also encloses and helps to protect the spinal cord.¹

According to *Merrill's Atlas*, the adult spine is composed of 24 true vertebrae that are separated into 3 segments based on body location. The cervical segment in the neck consists of 7 vertebrae. The thoracic segment in the upper back and thorax consists of 12 vertebrae, and the lumbar segment in the lower back consists of 5 vertebrae. The vertebral column is supported and held together by ligaments and joints.¹ Also considered part of the vertebral column are the sacrum and coccyx, which together are referred to as the pelvic section of the spine.¹

During prenatal development and in early childhood, the vertebral column consists of approximately 33 individual segments that include the pelvic segments

of the spine.² Figure 1A shows the lateral lumbar spine and lateral sacrum in a toddler. The lateral sacral image, Figure 1B, shows the individual sacral bodies before fusion. When the pelvic segments fuse, they are called false or fixed vertebrae.¹ The fusion of these vertebrae results in the appearance of 2 separate bones: the sacrum and the coccyx.

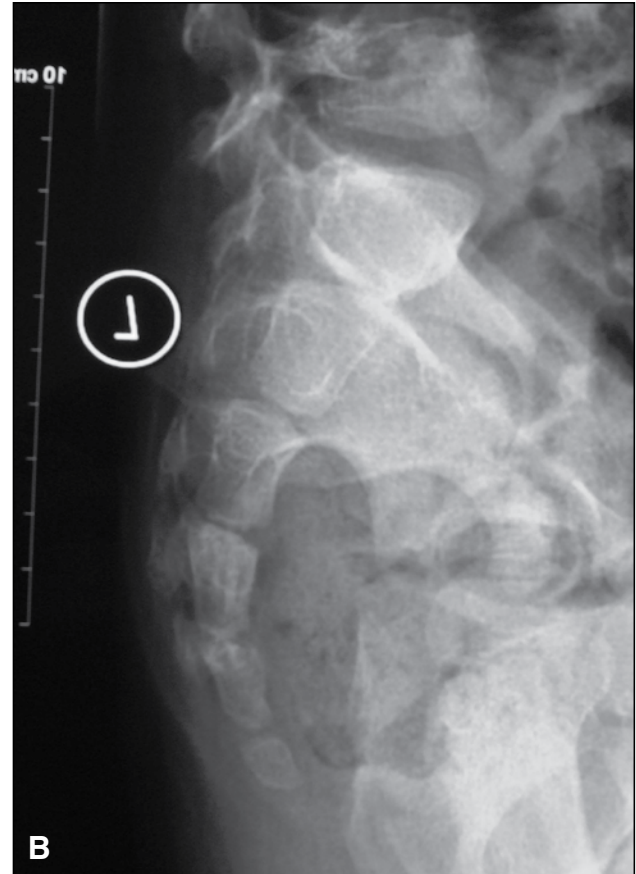
As medical imaging professionals, we know that our vertebral column is not perfectly straight, even though it may appear so in the posterior and anterior projections. When seen from the side, 4 slight curves are visible, arching anteriorly and posteriorly from the coronal plane and forming an elongated "S" shape.¹ These curves are normal and help us in our daily activities by keeping us balanced and flexible. The curves also help to absorb stresses placed on our bodies by impact activities such as running and jumping.² Normal curves of the spine develop as we grow and learn motor skills.^{1,2}

According to the National Scoliosis Foundation, 2% to 3% of the population has an abnormal curve to their spine called scoliosis.³ A common lay definition



Figure 1. Lateral images of the lumbar spine and sacrum in a toddler, demonstrating the separation of pelvic vertebrae before fusion into the sacrum and coccyx occurs.

of scoliosis is an abnormal side-to-side curvature of the spine. As imaging technologists, we frequently see evidence of scoliosis on lumbar and thoracic spine exams



but may know little about this condition beyond its definition.

This article is meant to enlighten imaging technologists about the curves of the spine, including information on scoliosis and imaging considerations for patients with scoliosis. Although there are several categories of scoliosis that affect people of different ages, this Directed Reading will focus on the most common form, which affects adolescents.

Normal Spinal Anatomy

Anatomy of the Vertebrae

Adult vertebrae vary slightly in size and shape according to their location in the spine. With the exception of the first and second cervical vertebrae, the spinal vertebrae have similar structural components that can be divided into 2 distinct sections: the body and the vertebral arch.^{1,2}