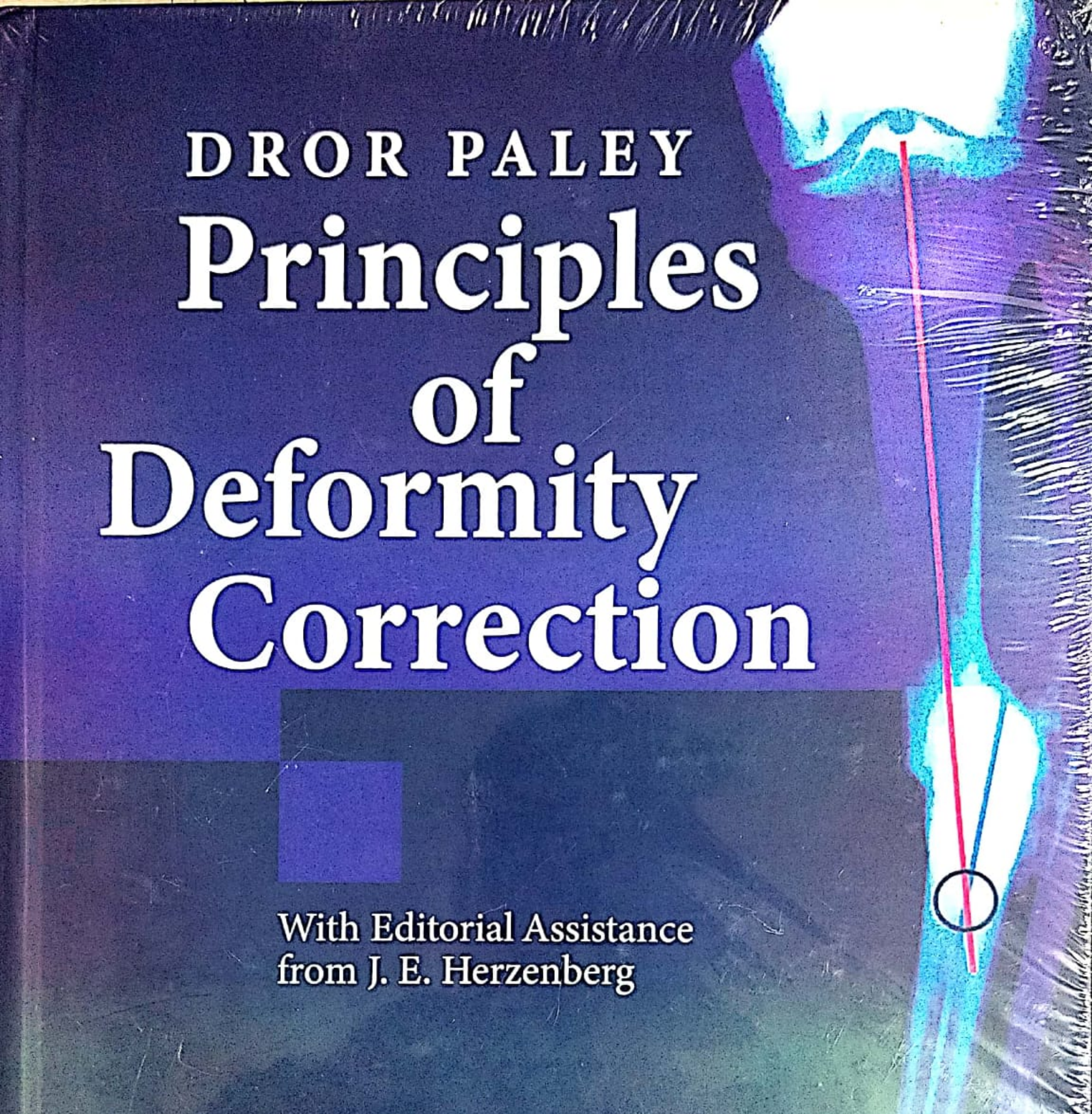


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Principles of Deformity Correction

With Editorial Assistance from J. E. Herzenberg

Springer

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Springer International Edition

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Normal Lower Limb Alignment and Joint Orientation

To understand deformities of the lower extremity, it is important to first understand and establish the parameters and limits of normal alignment. The exact anatomy of the femur, tibia, hip, knee, and ankle is of great importance to the clinician when examining the lower limb and to the surgeon when operating on the bones and joints. To better understand alignment and joint orientation, the complex three-dimensional shapes of bones and joints can be simplified to basic line drawings, similar to the stick figures a child uses to represent a person (► Fig. 1-1).

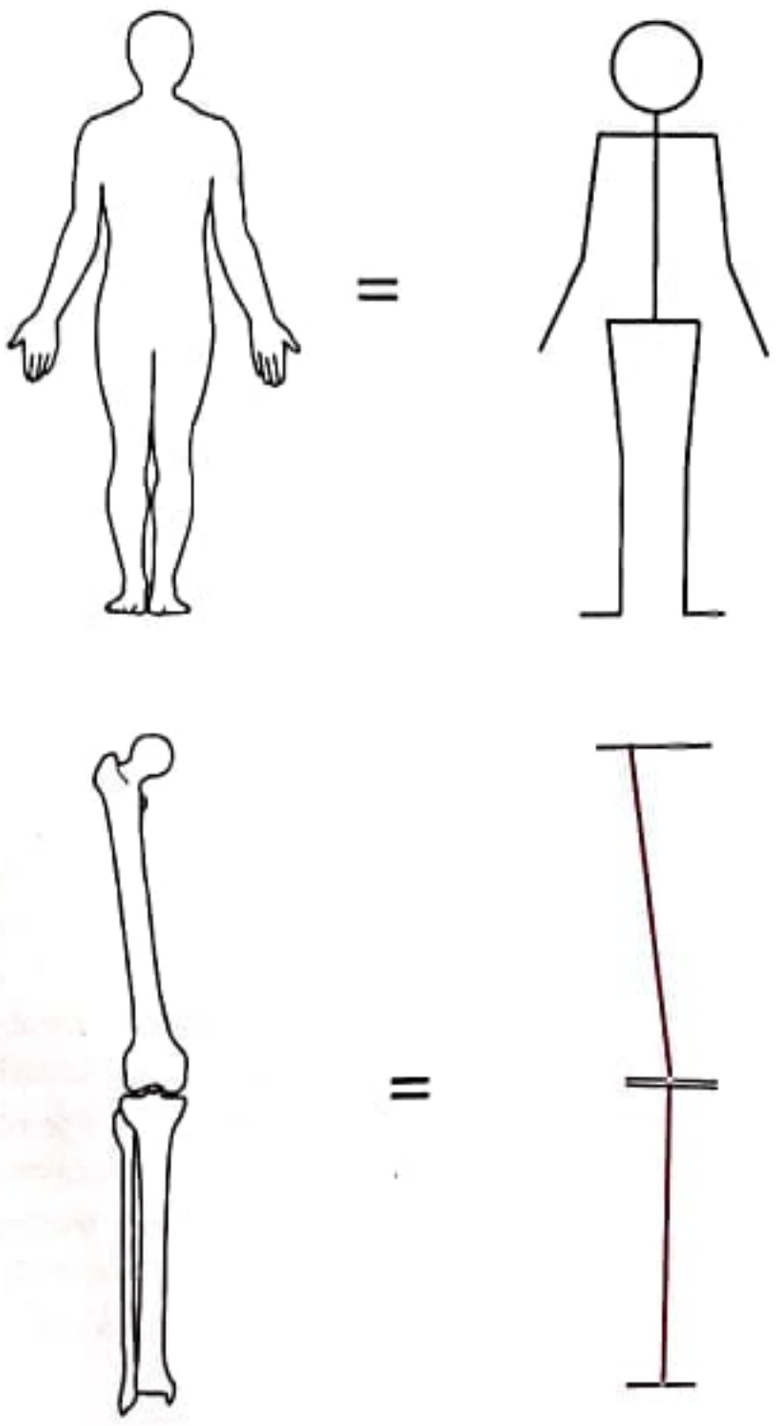


Fig. 1-1

Axis lines. A stick figure can be used as a schematic of a complex three-dimensional image of a person. In the same fashion, axis and joint lines can be used to describe alignment and joint orientation of the bones and joints of the lower limb.

Furthermore, for purposes of reference, these line drawings should refer to either the frontal, sagittal, or transverse anatomic planes. The two ways to generate a line in space are to connect two points and to draw a line through one point at a specific angle to another line. All the lines that we use for planning and for drawing schematics of the bones and joints are generated using one of these two methods (► Fig. 1-2).

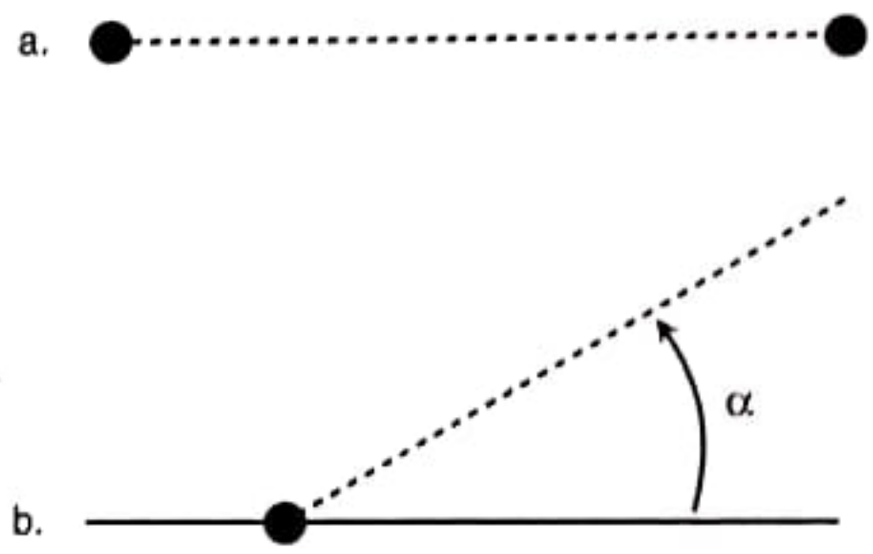


Fig. 1-2 a, b

Two methods of drawing a line in space.
a Connect two points.
b Draw a line through one point at a specific angle to another line.

Mechanical and Anatomic Bone Axes

Each long bone has a mechanical and an anatomic axis (► Fig. 1-3). The mechanical axis of a bone is defined as the straight line connecting the joint center points of the proximal and distal joints. The anatomic axis of a bone is the mid-diaphyseal line. The mechanical axis is always a straight line connecting two joint center points, whether in the frontal or sagittal plane. The anatomic axis line may be straight in the frontal plane but curved in the sagittal plane, as in the femur. Intramedullary nails (IMN) designed for the femur have a sagittal plane arc to reflect this. In the tibia, the anatomic axis is straight in

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Principles of Deformity Correction

Principles of Deformity Correction is a comprehensive text on the analysis, planning, and treatment of lower limb deformities. The nomenclature, based on normal frontal and sagittal plane alignment, which is easy to remember and can be derived without memorization, is the new universal language for orthopaedic deformities. This work offers detailed information regarding deformities and malalignment, including radiographic and clinical assessment, mechanical and anatomic axis planning, osteotomies, joint and gait compensatory mechanisms, and hardware considerations. The book is extensively illustrated to avoid confusion and to leave little to the imagination. The planning is further facilitated and practiced using an accompanying workbook and animated CD-ROM. The methods taught are simple, intuitive, and universal in their application for different hardware systems because they are principle based. This book is of equal interest to pediatric and adult orthopaedic surgeons and is taught at annual course (**www.deformitycourse.com**).

Exclusively Distributed by:

Jaypee Brothers Medical Publishers, New Delhi

B-3 EMCA House 23/23B, Ansari Road,
Daryaganj, Post Box 7198
New Delhi-110002, INDIA

Phone +91-11-23272143
+91-11-23272703
jaypee@jaypeebrothers.com

Springer

"For Sale in India, Pakistan, Nepal, Bangladesh and Sri Lanka Only"

ISBN 978-81-8489-063-1