CHAPTER : I

INTRODUCTION

Introduction

Biomechanics uses the laws of physics and engineering concepts to describe motion undergone by the various body segments; and the forces acting on these body parts during normal daily activities .

The interrelationship of force and motion is important and must be understood if rational treatment programs are to be applied to skeletal disorders.

Deleterious effect may be produced if during exercise or activity , the forces on disorderd parts rise to high levels, ***(Victor and Margareta, 1980)*** .

In his daily practice the orthopaedic surgeon deals with the effects of forces.

He may alter force systems by transferrig a tendon, by an arthrodesis of a spine, by designing an arch support, or performing an osteotomy .

He deals with the consequences of internal effects of externally applied forces and moments when a fracture is plated or a dislocation is reduced , ***(Victor and Albert, 1971)*** .

In any physical activity a complex pattern of forces is imposed on the bones of the skeletal system. These forces are of three types : (1) external forces acting on the body, (2) internal forces caused by muscle contraction or ligament tension, and (3) internal reaction forces between bones. The forces (also referred to as loads) cause small deformations of the bones on which they act. The mechanical response of a particular bone can be described by quantitatively assessing the relationship between the applied loads and the resulting deformations. The relationship between forces and deformations reflect the structural behavior of the whole bone . In moderate loading situations, bone deformations are only present, while the loads are applied. When the loads are removed, the bone reassumes its original position and geometry. If the skeletal system is exposed to severe trauma, the loads imposed on a bone become extremely high, resulting in large deformations and possibly in bone fracture, ***(Carter, 1985).***

The major factors that determine the deformation characteristics and fracture resistance of a bone are (1) the direction, magnitude, and rate of force application, (2) the size and geometry of the bone, and (3) the material properties of the tissue that comprises the bone large forces obviosly causes greater deformation and tendency toward fracture than smaller forces less well appreciated is the fact that the fracture behavior of a long bone when subjected to axial forces is much different from when it is subjected to transverse or torsional forces and that the bone can resist rapidly applied forces much better than slowly applied forces.

The anatomic differences among the bones of the skeleton tend to reflect the types of forces that act on the individeal bones.large bones are much better suited to resist forces than are smaller bones. Bones are specialized in their geometric configuration to resist forces in a particular direction .

The material properties of the tissue that comprises the bone are very important in determining the deformation and fracture properties of the bone . For example, an osteoprotic bone with the same geometry as a normal bone will experience greater defomation under loading and will fracture at lower force magnitude , ***(Carter, 1985)*** .

This essay does not study the chemical composition of the materials used in orthopaedic , but study the relationship between the forces and motion occurs by using the laws of physics and engneering .