INTRODUCTION

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AIM OF THE WORK

There is no type of injuries which a practitioner approaches with more doubt and misgiving than fractures, or one which demands a greater amount of ready knowledge, self-reliance and skill.

The ancients had difficulties in treating fractures, they used the materials then available.

The Egyptians used bandage stiffened with gum. The Arabs encased the fractured limb in a mound of cast. The Chinese and many Africans used wood or bamboo splints wrapped with leather or fibrous plants.

Although the use of metals can be traced for thousands of years, there wide spread application as surgical implant is limited to the past century.

Pressure for improved fracture stabilization came with the advent of radiology.

Prior to the 20th century, sporadic attempts were made at internal fixation of fractures. The first bone plate was made in 1886.

Progress in the field of internal fixation of fractures was achieved through improvement in two pathways. The first is the rapid development of metallurgy from an empirical art into a highly complex technology dealing with different metal properties. Perhaps the most influential reason for the rapid progress and extraordinary advances in the application of implants to orthopaedic surgery has been the close cooperation between surgeons, biologists and bioengineers.

Now we have metallic implants of high quality regarding strength, elasticity, corrosion resistance and are completely inert in the body.

The second pathway is the improvement of the methods of internal fixation of fractures and the availability of different designs and techniques for various situations and indications.

In recent years superior methods were developed to characterize the mechanical environment of the body and testing procedures were devised to determine suitability of materials in

the laboratory and in vivo. Through the efforts of the pioneers in internal fixation, it became an accepted method of fracture treatment. A satisfactory internal fixation is achieved only by anatomic reduction of the fracture fragments particularly in joint fractures, preservation of blood supply to the bone fragments and stable internal fixation designed to fulfill the local biomechanical demands.

By means of internal fixation the fragments of a fracture are hold rigidly together. Pain induced by fracture irritation is minimal and bone healing progresses in a mechanically neutral environment while the articulations, the muscles and the blood circulation are functioning optimally.

The implants used do, first of all, fulfil a mechanical task. They transmit load from one fracture fragment to the other and this not only ensures stability of fixation but also protects the implant by enabling the bone to bear at least part of the functional load again.

The stability of fixation is furthermore important as it reduces the relative motion not only between bone fragments, but also between the components of the implants. This demands good

understanding of the biomechanical stresses and forces that act on the skeletal system and on internal fixation appliances and a better understanding of the biologic properties and patterns of bone healing. Disturbed healing may result if the bone fragments become necrotic from loss of blood supply.

Knowledge of the stresses that will be applied to the bone and the fixation device as the limb returns to the normal function is essential for the proper selection and placement of the fixation device. The environment in the operating room should be superior, the personnel should be familiar with the technique, and a full set of the proper instruments and implants should be available.

A patient who is fully informed of the rewards and risks of internal fixation and who is willing to cooperate in rehabilitation following surgery can be the determining factor in the success of the method.

While stability of fixation should be the goal, no internal fixation will substitute for solid bone and allow unrestricted activity.

One must bear in mind, that the designer of the implant is

limited by biological requirements and the metallurgist simply can not produce a material to withstand the additional load due to inadequate internal fixation.

After open reduction and internal fixation a race goes on between the rate of healing and the rate of loss of fixation. Union usually occurs prior to fixation loss or implant failure when patient, fracture, implant and technique are properly matched.

In this age of moon voyages and heart transplants, the orthopaedic surgeon still facing the problem of implant failure.

Breakage or loosening of orthopaedic implants is one of the complications in surgical fracture treatment. It is important to understand the reason for these implant failures and its mechanism.

There are many factors that can lead to implant failure, more than one factor can be found in the case or just one factor is sufficient to lead to the failure.

These factors could be classified into :

1. Factors related to the implant material in the form of corrosion of the implant material.

2. Factor related to the surgeon in the form of improper selection of the type of the implant for a particular fracture, instruments and proper approaches to expose the fracture site without extensive damage of soft tissue surrounding it or its blood supply. The surgeon may also neglect the post-operative follow up of the patient regularly for sufficient time to detect any early changes which may end by implant failure.
3. Factors related to the patient in the form of sever osteoporosis or those patients who do not stick to the instructions of the surgeon.

Nowadays, material failures are rare causes of implant failure due to great improvement in metallurgy. So, the aim of this work is to draw attention to the problem and to clarify its aetiology, as a primary and essential step for prophylactic measures to avoid its occurrence and to improve our future results.

The most commonly used method for fixation is the plates and screws to which this study is directed in an attempt to determine the possible causes that lead to such failure.