

Analysis of Single Rod to Pin Frame's Bending Deformation on External Fixation Device in Unstable Pelvic Ring Fracture

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Abstract

External fixation of pelvic is a powerful tool used for the treatment of unstable pelvic ring fracture caused by receiving strong external force. In the process of assembling the external fixation, the length and relative angle of the components affect the stress distribution on the whole frame and then affect the stability of pelvic rings. However, there is no method has been put forward to indicate the relationship among deformation, the length of the rod, and magnitude of the applying force. In this study, we proposed a method to predict the deformation of external fixation according to the length, relative angle of components and applying force based on the unit load method. Experimental results show that the deformation rules of external fixation used in unstable pelvic ring treatment can be deduced by this method. This system can provide guidance when assembling the frame with a reasonable structure.

Keywords : Pelvic Ring Fracture, External Fixation Device, Unit Load Method, Bending Stiffness

1 Introduction

External fixation of pelvic is mainly used for the definitive treatment or temporary stabilization of unstable pelvic. This pelvic ring injuries which attribute to receiving a quantity of kinetic energy are often result in high-energy trauma. Characterized by its quick, simple application, external fixation is commonly accepted by clinical treatment in unstable pelvic ring fracture.

Several external fixation frames serving different needs have been proposed. However, the selection and assembly of external fixation depend on the clinical experience of doctors and surgeons to a large extent without quantitative criteria to evaluate these frames. When assembling the frame, many factors affect the stress of the frame, and then affect the treatment effect. After operation,