

# **Biomechanical Testing of Spinal Fusion Segments Enhanced by Extracorporeal Shock Wave Treatment: A Rabbit Experiment.**

## **Auhtor:**

Tao-Chen Lee, Ching-Jen Wang

## **Institutions:**

Chang Gung Memorial Hospital Kaohsiung Medical Center, Chang Gung University Collage of Medicine, 123, Ta-Pei Road, Niao-Sung, Kaohsiung Hsien, Taiwan

## **Device and producing company:**

1. OssaTron machine (HMT) (High Medical Technologies, GmbH, Kreuzlingen, Switzerland); 2. Qtest10 (a material testing machine) (MTS Systems Co., Minneapolis, MN, USA)

## **Introduction:**

Extracorporeal shock wave treatment (ESWT) has been proven effective in enhancing spinal fusion in a preliminary animal study. However, biomechanical tests were not performed.

## **Methods:**

All 12 rabbits in this study underwent decortication at the bilateral L5 and L6 transverse processes. Bone chips were bitten off and placed onto the intertransverse space. The rabbits were divided into two groups, a study group (n=6) and control group (n=6). In the study group, the bilateral L5 and L6 transverse processes were treated with 1,000 impulses of ESWT at 14 KV (equivalent to 0.18 mJ/mm<sup>2</sup>) at 12 and 18 weeks after surgery. The control group rabbits did not undergo ESWT. A series of radiographic examinations on each rabbit were performed subsequently. All rabbits were sacrificed at 21 weeks, and their spines were harvested for biomechanical tests.

## **Results:**

Radiographic examination showed 5 of 6 rabbits in the study group had callus formation in the fusion masses. Biomechanical tests of fusion segments showed that mean flexion stiffness (with internal control) of the study group was  $2.11 \pm 0.46$ , while that of the control group was  $1.17 \pm 0.19$ . Mean extension stiffness (with internal control) of the study group was  $1.70 \pm 0.39$ , while that of the control group was  $1.23 \pm 0.29$ . Statistical analysis showed that fusion segments in the study group had significantly better flexion and extension stiffness than those in the control group ( $P < 0.05$ ).

## **Discussion:**

In this animal study, radiographic examinations showed that ESWT stimulated new bone growth. Biomechanical tests showed that ESWT significantly increased flexion and extension stiffness of spinal fusion segments.

**Conclusion:** Biomechanical tests showed that ESWT significantly increased flexion and extension stiffness of spinal fusion segments.