
Materials and methods: Fifteen health adult sheep were divided into three experimental groups and tested:
(a) control group: Intact (n=5);
(b) injury group: destabilized by means of complete resection of the cervical spine ligament complex of C3-4(n=5);
(c) tendon reconstruction group: stabilization with heterograft bio-derived freeze-dried tendon, which were cross-fixed with “8” shapped in the 3-4 cervical bilatera facet joints(n=5). The sheep were euthanized at 12 months after surgery.

The biomechanical testing mainly evaluate the range of motion (ROM) under series of pure moments cycled from 0.75 to 3.5 Newton-meter for flexion, extension, right and left lateral bending, and axial rotation on a test apparatus. Statistical analysis was performed respectively (P< 0.05, ANOVA). In histological evaluation, HE, Masson and Immunohistochemical staining were performed. This study protocol has been approved by the Animal Experiment Ethics Committee of West China Hospital, Sichuan University in Chengdu, China.

Results: Biomechanics observation indicated that, compared with injury group, the novel fixation in tendon reconstruction group can provide enough stability in flexion motion, and do not limit the lateral bending and axial rotation motion. The values of ROM in tendon reconstruction group were closed to control group (P>0.05). On histological observation, in the tendon reconstruction group, the healing tissue showed regeneration of neovascularization. The bone-tendon interface had developed into dense connective tissue with little inflammatory cell infiltration. The transition zones of collagen fibers, fibrocartilage and bone occurred in the local region of tendon-bone interface. The collagen fibers were formed in abundance and regularly arranged.

Discussion: This novel fixation may provide enough stability and motion preservation. The bio-derived frozen dried tendon showed a good biocompatibility and ability of regeneration in animal model. Further study is needed to determine whether the cervical posterior fixation with other material may prove more promising for cervical dynamic stability reconstruction.

Keywords: Cervical posterior fixation; ligament complex; bio-derived tendon; histology; biomechanics