Can the Intra-discal Inflammatory and Degenerative Changes Be Prevented after Annulus Puncture? A Study on the Blocking Effect of a Kind of Polylactic Acid Patch

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Objective: PLA (polylactic acid) patch has proper steric configuration, sufficient mechanic strength and flexibility. This study aims to find out whether the intra-discal inflammation after annulus puncture can be prevented by sealing the pinhole left after annulus puncture with a PLA patch sticked by Shunkang medical glue.

Methods: Twenty healthy New Zealand white rabbits (weighing 2.0-2.5 kg) were randomly assigned to 4 groups (n=5): groups A, B, C and D. Group A was fake surgery group, in which the rabbits underwent exposure of intervertebral disc and transverse process at L2-7 as a control; in groups B, the rabbits received annulus puncture at L2-7 with an 18-gauge needle; and in groups C and D, the pinholes were sealed respectively with a polylactic acid patch sticked with medical gel and medical gel alone after annulus puncture at L2-7. General condition of rabbits was observed after operation. the intervertebral disc tissue was harvested. The tissue structure was observed on the plain HE section. And the expression of inflammatory factors including IL-1β, TNF-α and iNOs (inducible nitric oxide synthase) was detected with immunohistochemistry and ELISA.

Results: All the animals survived till the end of the experiment. In group A at 1 week, the nucleus pulposus tissue had normal structure. In group B at 1 week, leak of nucleus pulposus from the pinhole and slight adhesion to the adjacent tissue could be seen, and the nucleus pulposus tissue had significant degenerative change by light-microscopy. In groups C and D, clots of coagulated medical gel and extensive adhesion to the adjacent tissue could be seen; light-microscopy observation suggested that, the nucleus pulposus tissue of group C had similar histology manifestation to that of group A; while group D had similar histology manifestation to group B with obviously-decreased cells and disorder of matrix. ELISA test showed remarkably elevated expression level of inflammatory factors including IL-1β, TNF-α and iNOs in groups B and D when compared with group A, showing a statistically significant difference (P < 0.05), and a similar expression level was observed in group C (P > 0.05). There was a significant difference in the expression level between groups B and C and between groups C and D (P < 0.05), while no significant difference between groups B and D (P > 0.05).

Conclusion: The PLA patch sticked with medical gel is effective in blocking the intra-discal inflammation 1 week after annulus puncture.