Low-Dosage Intra-Articular Triamcinolone Fails to Reduce Joint Contracture

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BACKGROUND Higher dosage intra-articular triamcinolone has previously been shown to prevent joint stiffening in several joint contracture animal models though these same dosages induce a significant loss of chondrocyte viability. Furthermore, triamcinolone may increase infection risk and curtail bone healing after post-traumatic joint injury. Identifying an anti-inflammatory agent that could prevent joint contracture without the above side effects would be desirable. Minocycline is a semi-synthetic tetracycline antibiotic known for its anti-inflammatory effects that has been shown to inhibit leukotriene activity. Our objective was to evaluate the ability of low-dosage intra-articular triamcinolone versus oral minocycline to prevent joint contracture in an established model of post-traumatic knee immobilization.

METHODS After approval by the local Institutional Animal Care and Use Committee, 38 male Sprague Dawley rats, underwent intra-articular surgical trauma of the right knee with postop immobilization in 134° of flexion. The left knee was unoperated. Rats were assigned to one of the three treatment groups: control (CTL), intra-articular triamcinolone (TRI) injection (0.05 mg/kg) 24 hours postop, or oral minocycline (MIN) in drinking water (20 mg/kg) for 20 days. Rats were sacrificed 20 days after surgery, and musculature removed from the hindlimbs. Femorotibial angles were measured in operative and non-operative limbs with a 0.015 N·m extension moment applied. Angles were measured with the capsule/ligamentous tissues intact and with the posterior capsule cut. A contracture angle was calculated as the difference in angle between operative and nonperative limb.

RESULTS Contracture angles (mean± SD, larger angle=more contracture) for the intact condition were CTL (44±16), TRI (40±13), MIN (46±13) and for the posterior capsule cut condition were CTL (42±17), TRI (37±13), MIN (43±13). No significant difference in contracture angle was found (one-way ANOVA) between treatments for either the intact ($p=0.57$) or posterior capsule cut condition ($p=0.60$).

CONCLUSIONS Although high-dose intra-articular triamcinolone was previously shown to be effective as a prophylactic treatment for joint contracture, this was not true for a low dosage which would be less cytotoxic to chondrocytes. Recent work has shown inhibition of leukotriene activity may prevent fibrotic conditions. Minocycline which has been shown to inhibit leukotriene activity was ineffective in prevention of joint contracture.

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