

Chondrolysis after Continuous Intra-Articular Bupivacaine Infusion

An experimental model investigating chondrotoxicity in the rabbit shoulder

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INTRODUCTION: Postoperative pain pumps are increasingly used to deliver a continuous infusion of local anesthetic into the surgical wound or the joint. Recently, there have been concerns that the use of such devices may be associated with chondral toxicity and even cases of chondrolysis in the shoulder [1]. An experimental model is presented that investigates potential chondrotoxic effects of a continuous intra-articular infusion of Bupivacaine in the rabbit shoulder.

METHODS: 30 rabbits were divided into three groups that received continuous infusions of either saline, Bupivacaine, or Bupivacaine with Epinephrine over 48 hours into the glenohumeral joint. Animals were sacrificed after one week and tissue samples underwent analyses with confocal microscopy for live/dead cell assay, metabolic sulfate uptake assessment, and conventional histology.

RESULTS: Infusion of Bupivacaine with and without Epinephrine decreased sulfate uptake 58% and 49%, respectively, when compared with saline; cell viability decreased by 20% and 32%. Histology demonstrated significantly worse scores for Bupivacaine infusion. The results for Bupivacaine with or without Epinephrine were not significantly different.

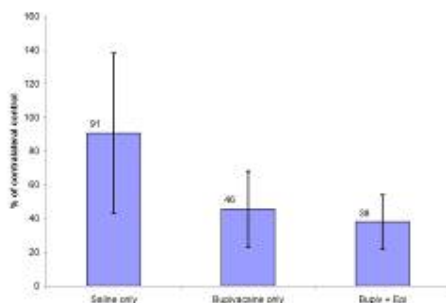


Fig. 1: Results of sulfate uptake expressed as activity ratio between the control and infused slides [Mean +/- SD].

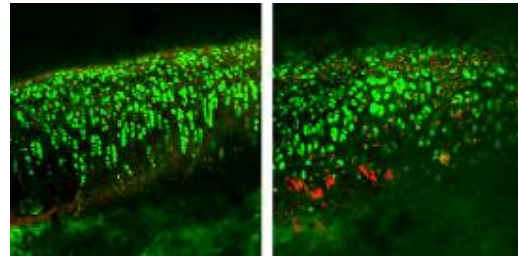


Fig. 2: Confocal microscopy images depicting articular cartilage from the control side (left) and after exposure to Bupivacaine with Epinephrine (right). Live cells stain green, while dead chondrocytes appear red.

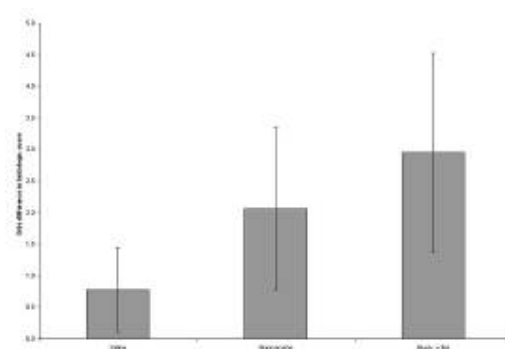


Fig. 3: Results of conventional histology presented as difference in histologic score between control and infused sides [Mean +/- SD].

DISCUSSION & CONCLUSIONS:

Continuous intra-articular infusion of Bupivacaine with and without Epinephrine led to significant histopathologic and functional changes in articular cartilage.

REFERENCES: ¹ Beck, C.; Hansen, B.; and Townsley, R.: Post-Arthroscopic Glenohumeral Chondrolysis: A Review of 8 Cases and the Use of Bupivacaine with Epinephrine Pain Catheters. publication pending, 2005.

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