EFFECT OF TENSILE FORCE ON EXPRESSION OF PTHrP AND TYPE X COLLAGEN IN ORGAN-CULTURED MOUSE SPHENO-OCCIPITAL SYNCHONDROSES

Submitted by Kanitnapang Bell Rukkulchon, D.D.S.

Objectives: Responses of sphenoid-occipital synchondroses to direct tensile stress have not been identified before. This study was, therefore, designed to evaluate expression of PTHrP, and thickness of hypertrophic zone in sphenoid-occipital synchondroses in response to such stress, using mouse in vitro model.

Materials and methods: Sphenoid-occipital synchondroses together with adjacent structures were excised from fifty 2-day-old mice that were randomly assigned to control and experimental groups (n=5). In the experimental group, tensile force of 0.2 grams was applied across the synchondroses, using helical springs. Both groups were then cultured for 6, 24, 48, 72 hours and 7 days. Alcian blue-PAS staining was used to study growth of the synchondroses; immunohistochemical staining to identify PTHrP and type X collagen expression. The area of PTHrP expression and thickness of hypertrophic zone, demarcated by type X collagen expression, were measured.

Results: Quantitative analysis showed that PTHrP expression increased significantly at hour 24 of the force application in the experimental group (p<0.05), then reduced from hour 24 to 72 with a significant drop from hour 24 to 48 (p<0.01); and the thickness of hypertrophic zone significantly increased at hour 48 (p<0.01).

Conclusions: Our findings suggested that the growth of sphenoid-occipital synchondroses could be modified by tensile stress; and an appropriate force value could enhance its growth, as evidenced by an increase in PTHrP expression and thickness of hypertrophic zone.