Preliminary Report

Clinical Study of Efficacy of Hydroxyapatite

Thaiyin Srimongkol MD*, Narong Bunyaratavej MD**

** PrapinKloa Hospital*
*** Siriraj Hospital*

The cleaved part of collagen during collagen formation was secreted into the circulation. The present study used this remnant part of collagen called procollagen type 1 propeptide at carboxyl terminal (PICP) as a bone formation marker. Clinical study of efficacy of hydroxyapatite tablet(800 mg) in 47 menopausal women with bone resorption marker, (CTx) below 0.330 ng/ml.and their general condition is healthy. All cases were free of medication at least one month before the present study. After one month, the mean of PICP was 1452.28 ng/ml SD=625.58 which is significantly higher than the mean of baseline control, 930.98 ng/ml SD=477.44 (p=0.0001)

Keywords: *Procollagen type 1 propeptide, PICP, Hydroxyapatite*

J Med Assoc Thai 2005; 88 (Suppl.5): S24-6
Full text. e-Journal: *http://www.medassocthai.org/journal*

Collagen in bone is type I which is synthesized by osteoblast ,the 2 similar types called alpha 1 and alpha 2 wind together into helix form but at both ends are not winding, these parts are called procollagen peptide of type I. Its name depends on its part having nitrogenous molecule that is called PINP (procollagen type I nitrogenous procollagen) ,the other is called PICP (procollagen type I a carboxyl procollagen)[1] because it has carboxyl group in its molecule. These parts are cleaved and secreted into the circulation so detection of PICP or PINP which are markers of bone formation. Ossein-hydroxyapatite compound contains components of the organic bone matrix with calcium, phosphorus and other trace elements. Experimental studies in rats, rabbits and dogs have shown that treatment with hydroxyapatite resulted in accelerated fracture healing[2-4].

Objective

The purpose of the present study was to prove the efficacy of bone formation by hydroxyapatite bone crystal. The PICP was used as a bone marker of formation.

Material and Method

1. Forty seven cases with no underlying disease and no medication before and during treatment except hydroxyapatite tablet of 800 mg/day for one month.

Correspondence to : Bunyaratavej N. Department of Orthopaedic Surgery, Faculty of Medicine, Siriraj Hospital, Mahidol university, Bangkok 10700, Thailand. Phone: 0-2419-7970, E-mail: todrnarong@yahoo.com

2. Every case had checked bone resorption marker (CTx) checked the accepted level is below 0.330 ng/ml.

3. Clot blood 5 ml. was checked for PICP before and after one month. (Takara kit®)

4. The result was analyzed by statistic (SPSS®). Pair t test was applied to test the difference between before and after treatment. P-value = 0.05 was considered statistically significant.

Results

The level of PICP increased statistically when compared to the base line control (p=0.001).

Discussion

The hydroxyapatite enhanced bone formation significantly (p=0.001) after one month. The level of PICP increased more than base line control about 99.00% The present study is a preliminary report to show that hydroxyapatite can be used in cases of bone remodeling with normal turnover ($CTx \leq 0.330$ ng / ml.) so hydroxyapatite is suitable for young adults for prevention of bone loss and enhance bone growth. In addition it can be administered in cases of controllable bone loss such as after bisphosphonate intervention.

Acknowledgement

The authors wish to thank Berli Jucker (Medical unit) for sponsoring hydroxyapatite, tablet of 800 mg and supplying the of bone marker kit.

References

1. Jerome Rossert,Belnoit de Cromberggh e. Type 1 collagen: structure,synthesis,and regulation. In:

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
V2	47	308	2863	930.98	477.444
V3	47	568	2987	1452.28	625.582
V4	47	.19	.43	.2655	.04905
Valid N (listwise)	47				

Fig. 1 Descriptive statistics V2 =PICP one month before treatment, V3 =PICP one month after treatment. V4 CTx, resorption bone marker

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1 V2 - V3	-521.30	560.725	81.790	-685.93	-356.66	-6.374	46	.000

Fig. 2 Shows the level of PICP is significantly higher than base line control with p=0.001

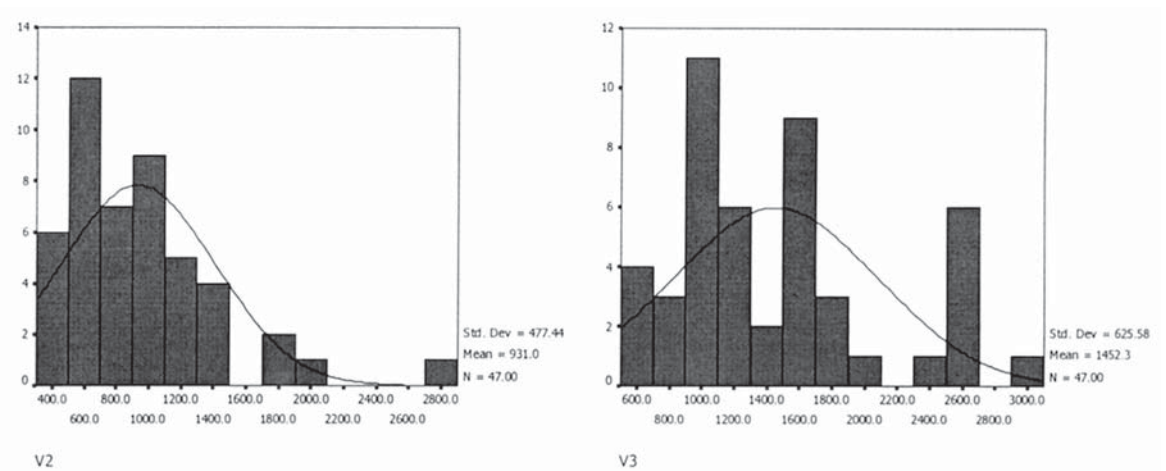

Fig. 3 The level of PICP before treatment, mean=931 ng /ml SD=477.44 and after treatment mean=1452.3 ng/ml SD=625.58

Brileizikian JP, Raisz LG,Rodan GA, editors. Principles of bone biology NewYork: Academic Press, 1991: 127-40.

2. Drivdahl RH, Howard GA, Baylink DJ. Extracts of bone contain a potent regulator of bone formation. Bioch Biophys Acta 1982; 26: 714-8.
3. Epstein O. Vitamin D,hydroxyapatite and calcium gluconate in the treatment of cortical bone thinning in postmenopausal women with primary biliary cirrhosis. Am J Clin Nutr 1982; 36: 426-30.
4. Annefeld M, Caviezel R, Schacht E, Schicketanz KH The influence of ossein-hydroxyapatite compound ('Ossopan') on the healing of bone defect. Curr Med Res Opin 1986; 10: 241-50.

การศึกษาไฮดร็อกซี่อาปาไทด์ในทางคลินิก

ไทยินทร์ ศรีมงคล, ณรงค์ บุณยะรัตเวช

ศึกษาผลของยา ไฮดร็อกซี่อาปาไทด์ 800มิลลิกรัมต่อวัน ในผู้ป่วยสตรีวัยหมดประจำเดือน ที่มีค่า CTx ไม่เกิน 0.330 ng/ml และไม่มีโรคประจำรวมทั้งไม่ได้รับยาใดๆ มาก่อนไม่น้อยกว่าหนึ่งเดือนผลการตรวจเลือดก่อนได้รับยาและหลังรับยาหนึ่งเดือน ค่าของ PICP สูงกว่าก่อนได้รับยาอย่างมีนัยสำคัญทางสถิติ (p=0.0001) ค่าของเฉลี่ย PICP ก่อนได้รับยาเท่ากับ 930.98นาโนกรัมต่อ มิลลิลิตร ค่าเบี่ยงเบนมาตรฐานเท่ากับ 477.44 หลังได้รับยาค่า PICP เพิ่มเป็น 1,452.28นาโนกรัมต่อ มิลลิลิตร ค่าเบี่ยงเบนมาตรฐานเท่ากับ 625.58 แสดงว่า ไฮดร็อกซี่อาปาไทด์ 800มิลลิกรัมต่อวันช่วยสร้างกระดูก