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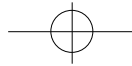
가

.

< >
: (calcium sulfate salt) (early & fast distraction) 가
가
: 가 (New Zealand white rabbit) 24
. 3 (latency period) 4 8mm
carboxymethylcellulose(CMC)
1 7 CMC, 2
가 3 6
(%BMD) 42 가
: 3 가, 6
, 6
가 (p<0.01),
: 가
: 가, , ,

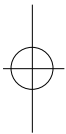
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2001





272 • / 15 2

0.045 Kirschner wire 5 6
 ,
 3
 (distraction osteogenesis) , (latency period) , 12 1mm , 4
 (bone defect) (limb length 8mm (early & fast distraction)
 discrepancy)
 4,8,9,10)
 (consolidation) 3.
 가 Wright medical technology
 2,3,7), Osteoset® (98%CaSO₄ · H₂O, 0.5%CaCO₃ · MgCO₃,
 0.3%CaCO₃)
 (demineralized bone matrix) (200mg /1cc
 (marrow-derived progenitor cells) CMC) CMC CMC cellulose
 5,6,16) polycarboxymethyl ether sodium salt
 가 7 1
 (Calcium sulfate salt) 가 1cc 2
 가 1cc CMC 3
 18 gauge
 1
 (Institutional Animal
 Care and Use Committee) 4. 가
 1. 1 가
 2000 2500gm
 가 24 3 3 가
 2. (DEXA, dual energy X-ray absorptiometry, Lunar®,
 10mg/kg ketamine HCl 3mg/kg Rompun®(Xylazine USA) 3 6
 hydrochloride) (P) (D), 가 (C) ROI(Regions
 (Celoslin®, Ceftezole Of Interest)
 sodium(1g/vial), 0.1cc of 100,000 u/kg) (C/ (P+D)/2) SPSS
 2 (42 가
 1.5mm)
 (monolateral) (U&I®, 10%
 Korea) (neutral buffered formalin) 1 ,
 10% (nitric acid) 10% (sodium



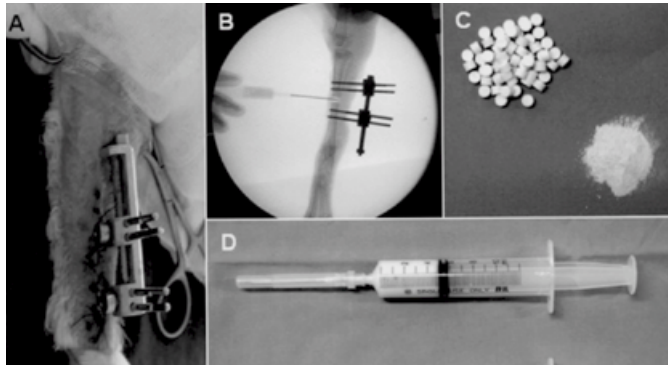
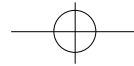


Fig. 1 After lengthening of rabbit tibia(A), calcium sulfate with CMC media was injected under the fluoroscopic guide(B). The pellets of calcium sulfate were grinded into powder(C). In the group I, the mixed material of calcium sulfate and CMC was injected(D-upper) and only CMC media was injected in the group II(D-lower).

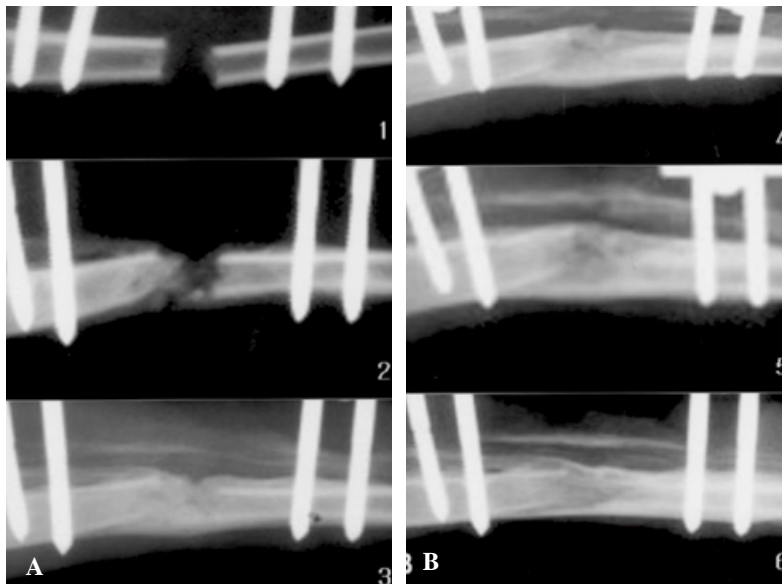


Fig. 2 Radiographs of animals in the group of calcium sulfate(group I). There were a faint calcific shadow at the distraction gap at 2 week and marked calcification at 3 week. A bone bridging was noticed in the distracted area at 6 week.

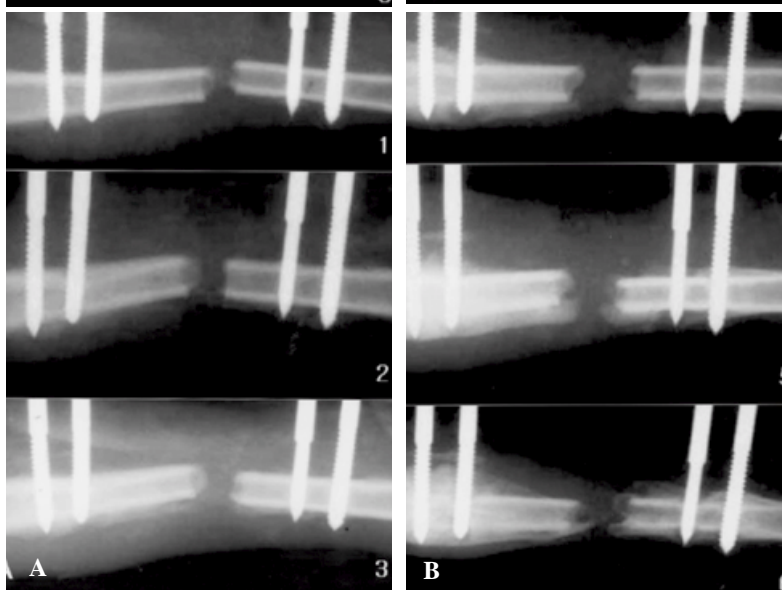


Fig. 3 Radiographs of animals in the group of CMC media(group II). There was no callus at 2 week. There were a tiny calcification at 4 week and an immature callus formation at the end-side of the cut part at 6 week.

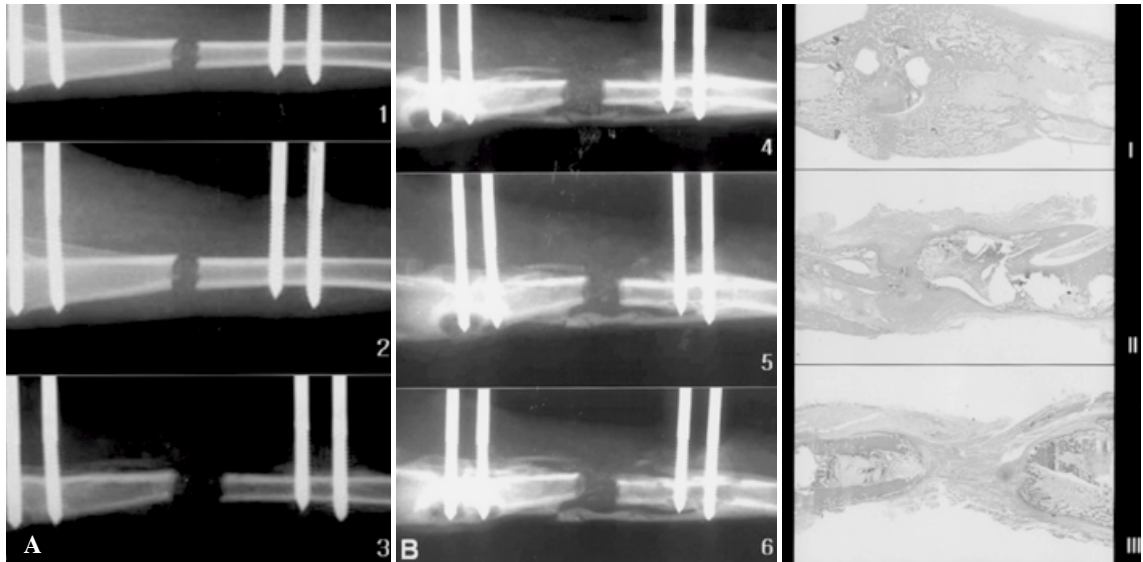


Fig. 4 Radiographs of animals in the group of control (group). There was no callus at 2 week. A little spotted calcification at 4 week and an irregular calcification in the distracted area at 6 week.

Fig. 5 Histologic findings with H-E stain (x5) at 6 week. There was new trabecular bone with numerous osteoblasts around the group of calcium sulfate(I), continuing the distraction gap. However, there was a little new bone with abundant fibrous tissue at the cut-end in both groups of CMC media() and simple distraction().

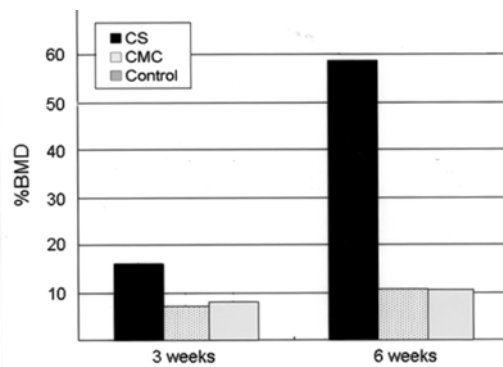
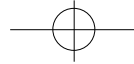


Fig. 6 The value of BMD percentage in the group I increased significantly than those in the group & , at 6 week.

citrate) 48 (scalpel) . hematoxylin-eosin ,가 가 , , (bony trabecula) (x5) (x40) .

3 가 (1 :1 , 2 :1 , 3 :1) 3 가 (2 :1 , 3 :2) .

1. 1 1 ,4 가 2 3 .6 1 가 , 2 3 가 , 1 가 .



가

• 275

2. 가
3 1 (16.1%) 가 11,14)
(2 : 6.9%, 3 : 7.1%) 가 Sidqui¹⁹⁾ (osteoblast)가
.6 1 (osteoclast)가
(58.4%) 2 (10.2%) 3 (10.4%)
($p < 0.01$).
가

3. (bone morphogenic protein)

가

가

CMC

가

, Al Ruhaimi¹⁾

CMC

가

(limb lengthening)

(distraction osteogenesis)

5),

12,13)

(consolidation)

가

Hematoxylin-eosin

가

3,20)

가

D

가

17,18)

(transforming growth factor),

(demineralized bone matrix),

(marrow-derived progenitor cells)

5,6,15,16)

가

가

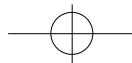
(autogeneous bone graft)

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Abstract

Effect of injected calcium-sulfate on the consolidation of distraction osteogenesis in rabbit model

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Purpose : To investigate whether injection of calcium sulfate salt powder could be used to facilitate consolidation of early & fast distraction osteogenesis.

Materials and Methods : Group I was experimental group and Groups and were controls. After 3 days of latency period, a small distractor was distracted for a total of 8 mm for 4 days. Calcium sulfate salt powder suspended in carboxymethylcellulose(CMC) solution was injected, whereas CMC media alone was injected in one control group and without intervention in the other control group.

Plain radiographs were taken on every weeks. We assessed the bone mineral density(BMD) at 3 and 6 weeks and %BMD was calculated. The rabbits were sacrificed at 6 weeks for histologic examination.

Results : In radiography, the distracted area was consolidated in the experimental group but not in control groups. The % BMD of the experimental group was significantly greater than that of control groups at 6 weeks($p<0.01$). In histologic examination, greater amount of newly formed bone was noted in the distraction zone of the experimental group, compared to two control groups.

Conclusion : Implantation of calcium sulfate powder can accelerate consolidation in distraction osteogenesis in rabbits.

Key Words : rabbit tibia model, early & fast distraction osteogenesis, injected calcium-sulfate powder, consolidation

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