

Clinical Experience with Capacitively-Coupled Electric fields

Myron MacDonald¹, Max Bonneau²

¹North Shore Bone Density Clinic, 1884 Marine Drive,
West Vancouver, B.C., V7V 1J6, CANADA

²Biotronics Research Corporation, 1104-3760 Albert Street,
Burnaby, B.C., V5C 5Y8, CANADA

Abstract: *The capacitively-coupled electromagnetic stimulation method used for therapy in this study has been previously described [1]. Targeted problems included difficult bone fractures, difficult fusions and loosened hip prostheses [2]. 146 Patients were treated between 1986 and 2000. Exclusion from the analysis = less than 2 months of treatment or inadequate documentation, regardless of the outcome. 132 patients remained for analysis. The overall success rate was 76%*

FRACTURES

The fractures were divided thus:

- a) Fresh Fractures = <5 months post-fracture or post-surgery.
- b) Delayed Unions = >5 months post-fracture or post-surgery, <9 post-fracture or post-surgery.
- c) Nonunions = >9 post-fracture or post-surgery with no radiological evidence of healing over the prior three months.

Scaphoid Fractures

30 scaphoid fractures were treated. 5 were removed from analysis. Of the 25 fractures available for analysis there were 21 that healed with no further therapeutic intervention, for an overall success rate of 87.5%. The average age of the fractures was 8.41 months.

Tibial Fractures

33 Tibial fractures were treated. 2 were removed from the analysis. Of the 31 fractures available for analysis there were 28 that healed with no further therapeutic intervention, for an overall success rate of 90%. The average age of the fractures was 8.48 months.

Radius/Ulna Fractures

14 radial and ulnar fractures were treated. None were removed from analysis. 12 healed with no further therapeutic intervention, for an overall success rate of 86%. The average age of the fractures was 4 months.

Clavicle Fractures

9 clavicle fractures were treated. Two were removed from the analysis. Of the 7 fractures available for analysis 4 healed for an overall success rate of 57%. The average age of the fractures was 22 months.

Metatarsal Fractures

9 metatarsal fractures were treated. 1 was removed from the analysis. Of the 8 fractures available for analysis 7 healed, for an overall success rate of 87.5%. The average age of the fractures was 8.6 months.

Femur Fractures

13 fractured femurs were treated. 3 were removed from the analysis. Of the 10 fractures available for analysis 8 healed for an overall success rate of 80%. The average age of the fractures was 32.5 mos.

FUSIONS

The fusions were divided thus: a) Fresh Fusions = <5 months post-surgery. b) Delayed Fusions = >5 months post-surgery, <9 post-surgery. c) Nonunions = >9 post-surgery with no radiological evidence of healing over the prior three months. 21 fusions were treated. 3 were removed from analysis. Of the 18 fusions available for analysis there were 6 that healed with no further therapeutic intervention and 12 that did not heal, for an overall success rate of 33%. The average age of the fusions was 13 months.

Nonunions

There were 28 nonunions (>9 mos.) in the above study. There was an overall success rate of 71.4%. The average age of the fractures or fusions in this subset was 31.25 months.]

LOOSENED HIP PROSTHESES

26 loosened hip prostheses were treated. 3 were excluded from the analysis. Of the remaining 23, 17 required no further therapeutic intervention for an overall success rate of 74%.

REFERENCES

- [1] M.K MacDonald, M.J.H Bonneau, "Treatment of a non-union of the scaphoid using capacitively coupled electric fields," in M. Blank (ed.), *Electricity in Biology and Medicine*. San Francisco Press, 1991
- [2] M.K MacDonald, M.J.H Bonneau, "The effect of capacitively coupled pulsed electric fields on painful hip prostheses: A four year follow-up," in *Proceedings of the 4th European Bioelectromagnetic Society Meeting*, Zagreb, Croatia, 1998.