Pulsed Electromagnetic Field Therapy Improves Chronic Pain and Clinical Outcomes in Patients with Painful Total Knee Arthroplasty: An Interim Analysis of a Multicenter Prospective Cohort Study

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INTRODUCTION:

Painful total knee arthroplasty (TKA), in otherwise well positioned cases, remains a problem that occurred in about 20% of cases after 1 year, according to the literature.

Postoperative noninvasive therapy with the use of pulsed electromagnetic field therapy (PEMF) in patients with painful TKA resulted in significant improvement in pain and functional recovery, as demonstrated by the preliminary results of this prospective cohort study.

METHODS:

The study plans to recruit two hundred and seventy-seven patients with painful TKA whose pain occurred from at least 30 days after surgery to a maximum of 180 days after surgery. All patients will be instructed to use local non invasive biophysical therapy with PEMF (1.5 mT, 75 Hz) for 4 hours a day for 60 days. Clinical evaluations such as Visual Analog Score (VAS), SF-12 Health Survey (SF-12), EuroQol (EQ-5D) are scheduled at 1 month, 2, 6, 12, and 24 months after PEMF treatment; Knee Society Score (KSS) is scheduled at 3 months of follow up. The use of nonsteroidal anti-inflammatory drugs (NSAIDs) is also recorded. Patients will be analyzed into three different groups based on the time elapsed between surgery and the beginning of PEMF therapy: Group 1 (30-90 days), Group 2 (91-150 days), and Group 3 (151-180 days).

RESULTS:

At the time of this interim analysis, 92 consecutive patients matched the inclusion criteria and were available for analysis: 32.6% male, 10.9% smokers, 5.4% diabetics, 90.2% primary TKA, 73.9% cemented TKA, 75% with nonresurfaced patella, 84.8% with medial parapatellar approach, 48.9% posterior stabilized (PS) implants. The reduction in pain and NSAID use was statistically significant compared with baseline as early as one month after PEMF and was maintained at each follow up ($p<0.0001$). The EQ-5D and SF-12 Health Survey questionnaires showed significant improvement from baseline to 12-month follow up ($p<0.0001$). The KSS showed significantly higher scores, for both functional score ($p=0.0006$) and knee score ($p=0.0034$), at 3 months. The analysis for the three subgroups is shown in Figure 1, 2, and 3. PEMF therapy was well tolerated by all patients, with no side effects.

DISCUSSION AND CONCLUSION:

The causes of chronic pain after TKA depend on surgical and biological factors. Among the biological factors, an important role is played by inflammatory response. Significant correlations were found between intraarticular inflammatory cytokines concentrations after TKA and functional knee scores. It has been shown that PEMF therapy acts as modulators of A_{2A} adenosine receptor and inhibits the release of major pro-inflammatory cytokines, such as interleukin-1β,-6,-8, exerting an strong anti-inflammatory effect at the joint.

This multicenter, prospective, cohort study demonstrated that PEMF therapy in patients with painful TKA is well-tolerated and leads to significant clinical improvements, pain reduction, and lower NSAIDs consumption.