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EVALUATION OF THE SENSORIMOTOR CONTROL OF RATS WITH CHITOSAN/FIBROIN 3D-SCAFFOLDS IMPLANTS

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Summary: Thousands of orthopedic surgical procedures are performed to restore or replace tissues that have been injured by disease or trauma. Normally, the treatment is done by autograft or allograft. They allow for improvement of the patient's life quality although there are some drawbacks including the risk of infection and transplant rejection. Biomaterials have been widely studied and shown to be a potential substitute for conventional treatment. Several materials are used for the preparation of scaffolds, such as chitosan (CHI) and fibroin (SF). This research aimed to evaluate the sensorimotor control of rats with CHI/SF 3D-scaffolds implants. Twelve male Wistar rats (300-400g) were divided into two groups (control and experimental) and submitted to calvarium surgery. These were anesthetized by thiopental sodium (50 mg/kg body wt.), the frontoparietal area was trichotomized and then, the subcutaneous tissue was dissected, in order to expose the calvarium. A fragment from the middle portion of the parietal bone was removed with the aid of a surgical motor. In the control group, the critical defect was filled only with blood clot, while in the experimental group it was filled with the CHI/SF 3D-scaffold. After that, the skin was repositioned and closed using a chirurgic suture. Each animal received a post-surgery intraperitoneal injection with anti-inflammatory and analgesic (1.1 mg/kg body wt.). Functional tests were conducted for evaluating thermal and secondary-mechanical (cutaneous) sensitivities thresholds, and the four-legged grip strength. These tests were conducted immediately before and 7, 14 and 21 days after the surgical procedure. Differences among groups were addressed by means of one-way ANOVA with Tukey's post-hoc test and they were considered significant for $p \leq 0.05$. The results showed that the thermal sensitivity test, for both control and experimental groups, showed an increase in the reaction time at 50 °C in the postoperative period, then decreasing after 21 days. The secondary-mechanical (cutaneous) results can be put similarly but with a decaying response after 21 days only for the experimental-group rats. Nevertheless, the data were statistically similar among both groups regardless of the time frame. Concerning the four-legged grip strength test, also a statistically similar behavior was observed between the groups regardless of the evaluation time. These results suggest that the clinical differences in all the tests were due to surgical procedure, not by applying CHI/SF 3D-scaffolds. Therefore, according to the employed methodology, it can be concluded that CHI/SF 3D-scaffolds do not change the mechanical and thermal sensitivity, neither the motor performance of rats. Other 3D-scaffolds are being tested as part of this research project and histological tests are been performed.