Review Article

Histological Study on The Possible Role of Platelet Rich Plasma in Repair of induced Acute Skeletal Muscle Injury in Adult Male Albino Rats

Soheir Assaad Filobbos, Sahar Gamal Abo Elfadl, Dalia Ibrahim Ismail, Emy Mohamed Refaat

Department of Histology, Faculty of Medicine, Cairo University, Cairo, Egypt

ABSTRACT

Background and Objectives: Musculoskeletal injuries are one of the most common causes of sport-related injuries. Conventional therapy is mostly not sufficient for proper rapid healing. Platelet rich plasma (PRP) therapy is a simple, efficient, and minimally invasive method. PRP contains a high density of growth factors that are believed to stimulate mitosis of fibroblasts and angiogenesis that accelerate the recruitment of satellite cells and promotes myogenesis, thus reducing recovery time.

Materials and Methods: Fifty-four adult male albino rats were included in this study. Animals were divided into four groups: group I (control group, n = 24), Group II (Trauma group, n = 6) had a crush injury to the right gastrocnemius muscle after anesthesia, then sacrificed after 2 hours, Group III (Spontaneous recovery group, n = 12) that received no treatment and was subdivided into subgroups III A and III B including 6 rats each that were sacrificed after 7 and 14 days respectively and Group IV (Treated group, n = 12) where animals were injected by 0.1 ml PRP in injury site immediately after injury then subdivided into subgroups IV A and IV B including 6 rats each that were sacrificed after 7 and 14 days respectively. Blood samples were collected and analyzed for serum creatine phosphokinase (CPK) level. Sections from the middle part of gastrocnemius muscle were processed for histological assessment using H and E., Masson trichrome stain, immunohistochemical staining for myogenin immunoreactivity, as well as semithin and ultra-thin sections for light and electron microscopic examination followed by morphometric and statistical studies.

Results: H. and E. and semithin sections of group II showed disorganized, fragmented, discontinued, and tapering muscle fibers. The connective tissue endomysium appeared widened and contained apparently numerous CT fibers and cells. Electron microscopy revealed discontinued muscle fibrils with disorganized myofibrils. Occasional disrupted or completely lost Z discs appeared at focal areas. Giant disfigured mitochondria appeared among the myofibrils. CPK level, mean area % of fibrous tissue and Mean Number of positive Myogenin Immunoreactive Nuclei were significantly elevated, while mean diameter of muscle fibers was significantly decreased versus the control group. Group III showed decrease in CPK level, partial improvement of muscle fibers damage, and increase in mean area % of fibrous tissue, Mean Number of Positive Myogenin Immunoreactive Nuclei and increase in muscle fiber diameter. Group IV showed prominent improvement proved histologically and morphometrically versus group III.

Conclusion: PRP was found to enhance and promote the repair of acutely injured skeletal muscle and accelerates the healing process with minimal fibrosis.

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