Review Article

Histological Study on the Possible Protective Effect of Platelet Rich Plasma (PRP) Versus Exosomes on Testicular Ischemia Reperfusion Injury in Adult Albino Rat

Sahar M. Gamal Eldean Abo Elfadl, Zeinab Sayed Hegab, Amal Ahmed Farag, Mai Mostafa Hamed Shaker

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

ABSTRACT

Background and Objectives: Testis is a sensitive organ to ischemic reperfusion (I/R) injury. Thus, ischemia and consecutive reperfusion cause altered hormone production and infertility that are determined by duration and degree of testicular torsion. Testicular injury is an emergency common among young and adult ages. Comparison of PRP and exosomes therapeutic effects in experimentally induced testicular I/R injury was the aim of this study.

Materials and Methods: 48 adult male albino rats were used in this study. Six rats were used to obtain blood samples for PRP preparation, 16 rats served as control group (I). Experimental rats were divided into: Group II; Six rats were subjected to bilateral testicular torsion for one hour followed by detorsion (reperfusion) for another hour then sacrificed. Group III; six rats were subjected to ischemia reperfusion injury (I/R) then further equally subdivided into subgroups IIIa and b; sacrificed after one and 4 weeks respectively from the start of experiment. Group IV; six rats were subjected to I/R, then PRP was intraparenchymal injected at the two poles of each testis, at a dose of 10 µl (2000 x 109/l) dissolved in 0.5 ml PBS, then rats further equally subdivided into subgroups IVa and b; sacrificed after one and 4 weeks respectively from the start of experiment. Group V; Eight rats were subjected to I/R, then PKH26-labeled exosomes were administered at a dose of 30 µg (100 µg/ml) dissolved in 0.5 ml PBS. Two days later, two rats were sacrificed to detect the homing of exosomes, and the remaining six rats equally subdivided into subgroups Va and b; sacrificed after one and 4 weeks respectively from the start of experiment. Biochemical, histological, molecular, morphometric and statistical studies were done.

Results: Degenerative features of testes in subgroup II were detected including sloughing of some cells that accumulate in the lumina of seminiferous tubules, loss of contact between basement membrane and spermatogonia in some tubules. Interstitial tissue showed homogeneous acidophilic material (exudate) and congested blood vessels. No obvious improvement was detected in group III. Both PRP (group IV) and exosomes (group V) had the ability to attenuate testicular I/R Injury and partially restore the normal testicular structure after one week of their administration. However, PRP was much more effective in reducing damage and promoting healing of testicular tissues after 4 weeks. On the other hand, after 4 weeks, exosomes treated group showed deterioration in the initially achieved short term improvement. The results were further confirmed by statistical and morphometric analysis.

Conclusion: The PRP and exosomes enhanced the short-term recovery of testicular damage post I/R injury. However, long term results showed that PRP exerted much more beneficial effects than exosomes.

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