

4th International conference on PLASTIC SURGERY AND AESTHETIC PRACTICES

September 06, 2021 | Webinar

Nerve gaps repaired with acellular nerve allografts recellularized with Schwann-like cells: Pre-clinical trial

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Background. Acellular nerve allografts (ANA) recellularized with mesenchymal stem cells (MSC) or Schwann cells (SC) are currently a therapeutic option for peripheral nerve injuries (PNI). This study aimed to evaluate the regenerative and functional capacity of a recellularized allograft (RA) compared with autograft nerve reconstruction in PNI.

Methods. Fourteen ovines were randomly included in two groups (n=7). A peroneal nerve gap 30 mm in length was excised, and nerve repair was performed by transplantation of either an autograft or a recellularized allograft with SC-like cells. Evaluations included a histomorphological analysis of the ANA, MSC pre-differentiated into SC-like cells, and at one-year follow up functional limb recovery (support and gait), and nerve regeneration using neurophysiological tests and histomorphometric analysis. All evaluations were compared with the contralateral hindlimb as a control.

Results. The nerve allograft was successfully decellularized and more than 70% of MSC were pre-differentiated into SC-like cells. Functional assessment in both treated groups improved similarly along time (p <0.05). Neurophysiological results (latency, amplitude, and conduction velocity) improved similarly in both treated groups at twelve months. Histological results demonstrated a less organized arrangement of nerve fibers (p <0.05) with an active remyelination process (p <0.05) in both treated groups compared with controls at twelve months.

Conclusions. ANA recellularized with SC-like cells proved to be a successful treatment for nerve gaps. Motor recovery and nerve regeneration were satisfactorily achieved in both graft groups compared with their contralateral non-treated nerves. This approach could be useful for clinical therapy of PNI.

Biography

Yadira Alejandra Tamez-Mata is MD and PhD student, on her last semester at Universidad Autonoma de Nuevo Leon (UANL), Facultad de Medicina. Age 31 years. She has collaborated in 10 papers (cited by 10) since 2017 in orthopedic and traumatology journals. Her current research is carried out in the bone and tissue bank of the UANL with the aim of developing an acellular nerve graft that can have clinical application in peripheral nerve injury patients.

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