



Polyethylene Glycol in Nerve Injuries Treatment – Systemic Review of Animal Studies.

Adriana M. Paskal¹, Wiktor Paskal¹, Piotr Pietruski², Michal Kopka¹, Albert Stachura¹, and Pawel K. Wlodarski¹

(1) Department of Methodology, Medical University of Warsaw, Warsaw, Poland, (2) Timeless Plastic Surgery Clinic, Warsaw, Poland

Introduction

Peripheral nerve injuries remain a challenging clinical problem. Despite optimally timed treatment, motor and sensory recovery is often unsatisfactory. Various concepts are investigated to enhance the effects of surgical repair. One of them is intraoperative polyethylene glycol (PEG) administration. Polyethylene glycol classified as fusogen mediates fusion of cell membranes. In posttraumatic nerve repair, properly reapposed nerve ends should facilitate PEG-mediated axolemmal fusion. It is reported that PEG treatment restores nerve conduction in electrophysiological examining, and produces rapid recovery of nerve function. The aim of this review was to summarize and compare the outcomes of animal studies on nerve injury that incorporated PEG treatment.

Materials & Methods

This systemic review has been performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The search was carried out on 1 June 2019, using PubMed and ScienceDirect as data sources. We searched for classical articles. The following keywords were used: “Polyethylene glycol” OR “PEG” AND “nerve” AND “injury”. The inclusion criteria included articles which reported in vivo PEG treatment of peripheral nerve injuries in animal models. Non-English articles were excluded.

Results

The literature search returned a total of 452 unique citations. 16 articles were included in the final analyses. The majority of studies was carried on the rat (15 studies, 93.75%). One study was conducted on a guinea pig. Experiments utilized different PEG application protocols on crush and cut injury models of the sciatic nerve (13 studies, 81.25%), facial nerve (2 studies, 12.5%), and femoral nerve (1 study, 6.25%). The outcomes were assessed with electrophysiological recordings (14 studies, 87.5%), behavioral (motor) testing (e.g., Sciatic Functional Index, Foot Fault Test) (11 studies, 68.75%), and histological analysis (12 studies, 75%). 14 studies (87.5%) provided data on PEG treatment superiority over the control group. In the remaining 2 studies (12.5%), PEG application protocol significantly differed than protocols used in studies reporting positive outcomes.

Conclusions

Currently, there is no gold standard treatment or outcome reporting measure for facial synkinesis. Our results suggest that this complex clinical challenge is likely best tackled non-surgically or through multimodal treatment. Despite the sufficient availability of studies, the level of scientific rigor demonstrated in the current literature does not allow adequate comparisons of effectiveness. Adoption of standardized patient evaluation and outcome reporting methods are necessary for robust comparative effectiveness studies in this area.



Flow Diagram

