Introduction: An increasing number of so-called minimally invasive therapies for low back pain and sciatica are being developed and marketed, many of them without any solid evidence to support their use. Epidural catheter techniques cover a part of this spectrum and beyond a purported mechanical mode of action, they employ a variety of pharmaceutical agents. Corticosteroids and other medications have been used for epidural injection and catheter techniques for a long time. Despite the fact that their mechanism of action in spinal pain syndromes is in part unknown and that some of them have no official labeling for epidural application, their use is expanding. One very popular therapy in this field is the epidural neuroplasty procedure that was pioneered by Gabor Racz and which uses a special drug cocktail (1). Despite indications for the effectiveness of this therapy (2), severe complications have been observed and it is unclear whether these are due to detrimental effects of the drug cocktail on epidural and/or neural tissues or to technical mistakes (3-5). We decided to use a cell culture model in order to investigate whether these drugs have the potential to damage or destroy cells.

Materials and Methods: Since much of the epidural tissues are connective tissues, we chose a fibroblast model. Human 015H fibroblasts were cultured in 6-well monolayer cultures for 24 hours, using $10^5$ cells per well in α-MEM (+ 10% fetal calf serum + 2% penicillin / streptomycin). At 24 hours, cells were changed into medium containing 10% NaCl, 0.5% bupivacaine, 1500 international units (IU) hyaluronidase and 40 mg triamcinolon-acetonide either alone or as a combination of all 4 drugs. These concentrations / amounts are representative of those used in clinical application. Incubation periods were chosen at 1, 6 and 24 hours in order to cover the likely time range during which most of these drugs are expected to undergo washout. Pure cell culture medium was used as control.

Results: Incubations with 10% NaCl or 0.5% bupivacaine as well as with the combination cocktail containing both drugs already for 1 hour led to the complete death of cell cultures. Triamcinolone caused a slowdown in proliferation ($3 \times 10^4$ cells/well) when compared to control ($1.1 \times 10^5$ cells/well) at 5 days. Incubation death of cell cultures. Triamcinolone caused a slowdown in proliferation ($3 \times 10^4$ cells/well) when compared to control ($1.1 \times 10^5$ cells/well) at 5 days. When performing dose-effect and time-effect testing with NaCl and with bupivacaine, we found proliferation-retarding effects with concentrations as low as 2% and 0.05%, respectively.

Discussion: The proliferation-retarding effect of the corticosteroid was not all unexpected, but the effects of even low concentrations of bupivacaine and NaCl surprised us. It is obvious that results from cell culture experiments do not directly translate to complex biological tissues or to clinical situations. However, these experiments indicate that there is a potential for cell damage with some of the pharmaceutical substances contained in the Racz epidural catheter cocktail and thus with other similar therapies. There clearly is a need for further studies on the potential risks of commonly used epidural medications. While many of these drugs have traditionally been used for the treatment of spinal pain syndromes, this does not necessarily imply that they are risk-free.

References:

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