ABSTRACT

Biocompatibility of Freeze-Dried Amniotic Membrane as Dural Graft Biomaterial Replacement in Duramater Duraplasty

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Purpose: to test the biocompatibility of freeze-dried amniotic membranes as duramater biomaterial replacement for dural defects against surrounding brain tissue

Method: This is an experimental study in two stages. The first stage is in vitro, to assess the toxicity of amniotic membrane exposure and the conditioned medium for mouse brain cell culture with MTT, DAPI, and Annexin-V staining for viability, proliferation, and apoptosis respectively. The second stage was *in vivo*, to assess the effect of inflammation with duraplasty using amniotic membrane in wistar rats. Brain preparations were taken *enbloc* and immunohistochemical staining was done to assess levels of IL-1β, IL-6, TNF-α, COX-2, and iNOS at the time of treatment 4 and 14 days. Data is processed and tested by statistical analysis.

Results: *In Vitro* experiment showed 76% cell viability in conditioned medium group and 90% cell viability in direct amniotic membrane group. Cell culture proliferation of treatment group was increased in conditioned medium exposure and decreased in direct amniotic membrane exposure. Apoptosis did not shown a significant difference upon exposure. *In Vivo* experiment showed a significant increase of IL-1β, IL-6, and TNF-α expression on day 4 in control group compared to treatment group (p=0,001). Proinflammatory cytokines expression showed a significant decrease on day 4 and 14 in both treatment and control group. No significant difference observed for COX-2 expression in both treatment and control group. iNOS expression was significantly higher on day 4. Significant decrease was observed on day 14 but no significant difference between treatment and control group.

Conslusion: Amniotic membrane exposure did not shown toxic effect on cell culture and did not overproduce inflammatory response on mouse brain tissue. Freeze-dried amniotic membrane is a safe and compatible biomaterial for duraplasty.

Keyword: Amniotic membrane, viability, proliferation, apoptosis, cytokines, MTT, DAPI, Annexin-V, IL-1β, IL-6, TNF-α, COX-2, iNOS.

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