Natural materials such as collagen and alginate have promising applications as dural substitutes. These materials are able to restore the dural defect and create optimal conditions for the development of connective tissue at the site of injury. A promising material for biomedical applications is chitosan-a linear polysaccharide obtained by the deacetylation of chitin. It has been found to be nontoxic, biodegradable, biofunctional and biocompatible in addition to having antimicrobial characteristics. In this study we designed new chitin-chitosan substitutes for dura mater closure and evaluated their effectiveness and safety. Chitosan films were produced from 3 % of chitosan (molar mass-200, 500 or 700 kDa, deacetylation rate 80-90%) with addition of 20% of chitin. Antimicrobial effictively and cell viability were analysed for the different molar masses of chitosan. The film containing chitosan of molar mass 200 kDa, had the best antimicrobial and biological activity and was successfully used for experimental duraplasty in an in vivo model. In conclusion the chitin-chitosan membrane designed here met the requirements for a dura matter graft exhibiting the ability to support cell growth, inhibit microbial growth and biodegradade at an appropriate rate. Therefore this is a promising material for clinical duroplasty [1].

A retrospective cohort study was conducted of 81 adult patients who underwent an elective decompressive surgery for treatment of symptomatic Chiari I malformations, with duraplasty involving a dural substitute derived from either bovine or porcine collagen matrix. Demographics and treatment characteristics were correlated with surgical outcomes.

RESULTS: A total of 81 patients were included in the study. Compared with bovine dural substitute, porcine dural substitute was associated with a significantly higher risk of pseudomeningocele occurrence (odds ratio, 5.78; 95% confidence interval, 1.65-27.15; P = 0.01) and a higher overall complication rate (odds ratio, 3.70; 95% confidence interval, 1.23-12.71; P = 0.03) by univariate analysis. There was no significant difference in the rate of meningitis, repeat operations, or overall complication rate between the 2 dural substitutes. In addition, estimated blood loss was a significant risk factor for meningitis (P = 0.03). Multivariate analyses again showed that porcine dural substitute was associated with pseudomeningocele occurrence, although the association with higher overall complication rate did not reach significance.

CONCLUSIONS: Dural substitutes generated from porcine collagen, compared with those from bovine collagen, were associated with a higher likelihood of pseudomeningocele development in adult patients undergoing Chiari I malformation decompression and duraplasty [2].

1)
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2)
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