Transforming Growth Factor Beta (TGF-β), Basic Fibroblast Growth Factor (bFGF) and Fibroblast Growth Factor Receptor 1 (FGFR1) Appearance in Congenital Intra-abdominal Adhesions in Children under One Year of Age

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Introduction. Congenital intra-abdominal adhesions occur due to disruption of normal embryologic development. Interruption of typical intestinal rotation and fixation during fetal development can occur at a wide range of locations. The most common type found in paediatric patients is incomplete rotation predisposing to midgut volvulus. There are limited publications that investigate the possible aetiology and pathogenesis of congenital peritoneal adhesions.

Aim. The aim of the study is to investigate expression of TGF-β, bFGF and FGFR1 in congenital intra-abdominal adhesions.

Material and Methods. The specimens used for research were obtained from 50 patients aged 1 to 292 days who underwent abdominal surgery due to the obstructive gut malrotation and several additional pathologies. Specimens are the property of the collection of the Institute for Anatomy and Anthropology of Rīga Stradiņš University. Tissues were processed for TGF-β, bFGF, FGFR1 by means of biotin-streptavidin immunohistochemistry. For the quantification of structures, the semiquantitative counting method was used. The designations were as follows: 0, negative reaction; 0/+, occasionally marked structures in the view field; +, a few positive structures in the view field; +/++ few to moderate positive structures; ++, a moderate number of marked structures in the view field; ++/+++, moderate to numerous number of positive structures; +++, a numerous number of marked structures in the view field; ++++, abundance of marked structures found in the view field. Data analysis was conducted using Statistical Package for the Social Sciences (SPSS) program version 20.0. Pearson's correlation test was used to evaluate the correlation in between growth factors. Two-tailed P values of < 0.01 were considered as statistically significant.

Results. A numerous number of TGF-β positive structures was found in five specimens, but a moderate to numerous number was observed in 14 specimens. A moderate number of TGF-β positive fibers was observed in 20 cases; in another eight cases few numbers of these structures were positive for TGF-β. A completely negative reaction was not observed. bFGF was seen exclusively in fibroblasts and macrophages. In four cases the number of marked cells was abundant, in five cases numerous, but in two cases moderate to numerous. Eleven specimens showed a moderate number of bFGF positive cells. Two specimens showed few to moderate bFGF positive cells, 15 – few positive cells. Occasional positive fibroblasts and macrophages were observed in four cases. 15 specimens showed a completely negative reaction to bFGF. A numerous number of FGFR1 fibroblasts and macrophages were observed in five cases. In another eight cases a moderate to numerous number of positive structures was marked. FGFR1 positive structures were mostly seen in moderate (13 cases) and few to moderate (12 cases) appearance. Few fibroblasts and macrophages contained this factor in nine specimens. Occasional positive structures were observed in three cases. Using the Pearson's correlation test, a strong positive correlation was observed between the immunoreactive structures for bFGF and FGFR1 ($r = 0.523$; $p < 0.001$).

Conclusions. Persisting appearance of TGF-β positive structures in congenital adhesions indicates the continuing growth/regeneration potential of loose connective tissue. Connection between the less distinct bFGF and more prominent FGFR1 proves the compensatory stimulation of receptors as a response on the lack of the same factor in course of adhesion disease.