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Different stages of pelvic prolapse: morphologic and biochemical analysis of anterior vaginal wall

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Collagen is ubiquitous in the human body and it is the main component of connective tissue. Collagen is also the principal component of endopelvic fascia and it is involved in the physiopathology of female organ prolapse (POP). The role of collagen in the physiopathology of POP has been studied with conflicting results, being difficult to distinguish the cause from the effect and to standardize the samples. The turnover of connective tissue in the vaginal wall is an important process both in healthy women and in women with prolapse. MMP-1, MMP-8 and MMP-13 specifically cleave native triple collagen (I, II, III) helix, yielding two fragments. These fragments are subject to gelatinase (MMP-2 and MMP-9) degradation. MMP-2 and MMP-9 activity, may be regulated at different levels (transcriptional and activation level) influencing the amount of collagen.

Aim of this study is to find a correlation between staging of anterior vaginal wall prolapse and morphologic and biochemical (MMP-2 and MMP-9 amount) features of anterior vaginal wall.

Anterior vaginal wall full thickness biopsies (eightyfive patients) including endopelvic fascia have been collected during surgical procedures. Recurrence or vault prolapse have been ruled out. POP samples have been classified according to POP-Quantification and they have been divided in three groups: group A (controls), group B (I and II stage prolapse) and group C (III and IV stage prolapse). Each sample has been processed for both microscopic and zymography analysis.

Formalin fixed samples have been embedded, cut and stained with Trichromic Masson Goldner (TMG) stains. Microscopic analysis have been performed to evaluate collagen amount, collagen organization, and to assess muscular component. All parameters have been scored semi-quantitatively by two blind observers on vaginal mucosa and underlying fascia. MMP-2 and MMP-9 activity have been evaluated by gelatine zymography. Statistical evaluation have been made by One-Way ANOVA analysis of variance.

An increase in collagen content and a better connective organization in women with prolapse greater than III stage (group C $p < 0.05$) is demonstrated. Moreover a significant decrease in MMP-2 activity is evident in high stage prolapse if compared with controls (group C $p < 0.05$). The data obtained suggest that high stage POP is correlated with a reduction of MMP-2 collagenic activity that determines an increase in collagen amount. Such observation correlates with the common finding of a subjectively thickened vaginal wall of patients affected by a III – IV stage (Group C)

Key words

Pelvic prolapse, collagen, morphology, metalloproteinase, anterior vaginal wall