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HISTOLOGICAL ASSESSMENT OF VAGINAL WALL AT DIFFERENT STAGES OF PELVIC ORGAN PROLAPSE

Hypothesis / aims of study

Collagen is ubiquitous in the human body and it is the main component of connective tissue. Several different types of collagen have been identified and is known that it is strongly represented in the vaginal wall and endopelvic fascia. Therefore collagen is the main component of the pelvic supporting structures and Pelvic Organ Prolapse (POP) is the clinical manifestation of a muscular and connective tissue damage while pelvic floor reconstructive surgery mostly uses damaged fascial structures for primary repair of 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 (1).

In this study it has been evaluated the microscopic morphology of the anterior and posterior vaginal wall of patients affected by different stages of POP.

Study design, materials and methods

Vaginal wall biopsies have been obtained during surgical procedures performed from January 2007 to January 2008. Sampling procedure was standardized according to the POP-Q classification system.

Each biopsy of anterior vaginal wall was provided during cystocele repair as a midline longitudinal full thickness excision including pelvic fascia. Biopsies on posterior compartment were obtained during posterior repair procedures also including a longitudinal midline excision of the vaginal wall and rectovaginal space. Posterior biopsies were further divided according to POP-Q classification system in Ap, Bp. And D point respectively. All samples have been grouped according to the ICS prolapse stadiation. Recurrences or vault prolapses have been ruled out. All biopsies have been freshly cut for fixation and snap frozen sections.

Formalin fixed samples have been embedded, cut and stained with Hematossilin & Eosin (H&E) and Trichromatic Masson Goldner (TMG) stains. Microscopic evaluation on H&E was performed to quantify inflammatory infiltration and vascularization. Microscopic evaluation on TMG was performed to assess collagen amount, organization and composition and to assess the muscular component. All parameters were scored semi-quantitatively by two blind observers on two areas of interest.

Snap frozen sections have been stored for immunoenzymatic, RNA, and zimography analisys.

Results

Forty women have been biopsied for a total of 67 biopsies (35 on anterior vaginal wall an 32 on posterior vaginal wall: 21 cases Stage I, 21 Cases Stage II, 25 cases Stage III). A statistically significant difference was noted in the anterior fascia between stage II and III in terms of increase of collagen amount and decrease of fibroblast, while in posterior vaginal mucosa and in recto-vaginal space at Ap point was noted a different amount of collagen between stage I and II. At Bp point there was a significant reduction of organization of the collagen of recto-vaginal space between stage I and II. At the same point it was also noticed a significant reduction of muscular tissue with the increase of the stage of prolapse (I vs III and II vs III). Both in mucosa and recto-vaginal space of D point, amount and organization of collagen significantly increased between stage I and II and between stage I and III. In the posterior vaginal mucosa of women operated for stage I prolapse, the amount and organization of collagen significantly reduced from Bp to D, while in the recto-vaginal space only organization did between Ap-Bp and D.

Interpretation of results

These results enhance the hypothesis that there is a correlation between the clinical expression of POP and the histological setting. The differentiation in stages of our biopsies let us conclude that there is a progressive change in collagen amount and characteristics that apparently occur more prematurely in the posterior compartment.

Our evaluation of the posterior vaginal wall according to the POP-Q classification provided some information about the characteristics of the recto-vaginal space: in patients with stage I rectocele it was noticed a peculiar arrangement of the collagen, characterized by a “vertical” polarity. In our opinion this observation could reflect the normal anatomy of the recto-vaginal space (2). The standardization of the sampling technique required dedication by the surgeon but let us have comparable biopsies.

Clinically these histological observations could explain the higher recurrence rate of traditional reconstructive pelvic surgery in the treatment of high-stage prolapse as due to a “low quality” supporting tissue.

Our next step will include an immunohistochemical classification of the collagen and a deeper analysis of the collagen turnover.

Concluding message

This study confirm the hypotesis that there is a correlation between the clinical staging of the POP and the histological aspect of the supporting tissues. This could have consequences on timing and type of surgery.

References

1.Obstetrics and Gynecology (2005) 106; 953-963
2. American Journal of Obstetrics and Gynecology (2005) 193; 2050-5

Specify source of funding or grant	**No external fundings were provided for the realization ot this work**
Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**Yes**
Specify Name of Ethics Committee	**The study followed the rules in the Declaration of Helsinki The protocol was submitted to the Ethical committee of the Azienda Ospedaliera San Gerardo dei Tintori, Monza: Ethical committee is composed by Prof Rodolfo Milani, Dott Patrizia Vergani and Prof Costantino Mangioni.**

	Informed consent to collect biopy was asked to sign before operation
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**Yes**