Study of Prolapse-Induced Cervical Elongation

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Abstract

Objective: The cervix often appears to be elongated in women with pelvic organ prolapse (POP). This can pose surgical challenges. MRI evidence has suggested that prolapsed cervices are significantly longer than those in normal controls. Our objective was to compare cervical length in surgical hysterectomy specimens from women with symptomatic POP with the length in specimens from women with other benign gynaecological conditions.

Methods: In this pilot, prospective, case-control study, hysterectomy specimens were collected at St. Paul's Hospital, Vancouver, BC, between 2013 and 2015. Recorded patient demographics were age at the time of hysterectomy, any prior history of cervical dysplasia, and reason for hysterectomy. Specimens from women in whom the indication for hysterectomy was POP were compared with the specimens from women with other benign gynaecological conditions. Specimens were excluded if there was a history of cervical dysplasia because we could not verify whether women had undergone previous procedures resulting in cervical shortening. After bivalving each uterus, cervical and total uterine lengths were measured by staff pathologists, and the ratios of cervical length to total uterine length were calculated. Measurements in the two hysterectomy groups were compared using linear regression.

Results: Seventy-seven specimens were collected, 52 from women with POP and 25 from women without POP. The most common indication for hysterectomy in women without POP was uterine fibroids. Women with POP were on average older than women without POP (mean 58.5 years vs. 47.8 years, $P < 0.001$). The ratio of cervical length to total uterine length in women with POP was 0.10 higher (95% CI 0.03, 0.16; $P = 0.005$) than in women without POP.

Conclusion: Women with symptomatic POP have significantly higher ratios of cervical length to total uterine length than women without POP.

Résumé

Objectif : Le col utérin semble souvent être allongé chez les femmes qui présentent un prolapsus des organes pelviens (POP). Une telle situation peut donner lieu à des défis chirurgicaux. Des données probantes issues de l'IRM ont laissé entendre que les cols utérins en prolapsus sont significativement plus longs, par comparaison avec les cols utérins que l'on constate chez des témoins normaux. Nous avions pour objectif de comparer la longueur cervicale constatée chez des prélèvements chirurgicaux d'hystérectomie issus de femmes présentant un POP symptomatique à la longueur constatée chez des prélèvements issus de femmes présentant d'autres troubles gynécologiques bénins.

Méthodes : Dans le cadre de cette étude cas-témoins prospective pilote, des prélèvements d'hystérectomie ont été recueillis au *St Paul's Hospital* de Vancouver, en C.-B., entre 2013 et 2015. Les caractéristiques démographiques qui ont été consignées pour chacune des patientes ont été les suivantes : âge au moment de l'hystérectomie, antécédents de dysplasie cervicale et motif ayant mené à l'hystérectomie. Des prélèvements issus de femmes chez lesquelles le POP avait constitué le motif ayant mené à l'hystérectomie ont été comparés à des prélèvements issus de femmes ayant présenté d'autres troubles gynécologiques bénins. Nous avons écarté les prélèvements qui étaient issus de femmes ayant présenté des antécédents de dysplasie cervicale, car nous ne pouvions pas vérifier si ces femmes avaient subi au préalable des interventions ayant mené au raccourcissement du col utérin. Après avoir sectionné chacun des utérus, le personnel du service de pathologie en a mesuré la longueur cervicale et la longueur utérine totale; les rapports longueur cervicale/longueur utérine totale ont par la suite été calculés. Les mesures effectuées au sein des deux groupes d'hystérectomies ont été comparées au moyen d'une régression linéaire.

Résultats : Nous avons recueilli 77 prélèvements : 52 issus de femmes ayant présenté un POP et 25, de femmes n'ayant pas présenté un tel prolapsus. La présence de fibromes utérins constituait l'indication ayant le plus fréquemment mené à la tenue d'une hystérectomie chez les femmes qui n'avaient pas connu un POP. Les femmes ayant présenté un POP étaient, en moyenne, plus âgées que les femmes qui n'avaient pas connu un tel prolapsus (moyenne : 58,5 ans vs 47,8 ans, $P < 0,001$). Chez les femmes qui avaient connu un POP, le rapport longueur cervicale/longueur utérine totale était plus élevé, selon un facteur de 0,10 (IC à 95 %, 0,03 à 0,16; $P = 0,005$), que chez les femmes qui n'avaient pas connu un tel prolapsus.

Conclusion : Les femmes qui connaissent un POP symptomatique présentent des rapports longueur cervicale/longueur utérine totale significativement plus élevés que ceux des femmes ne connaissant pas un tel prolapsus.

Key Words: Cervical elongation, pelvic organ prolapse, pathology

Competing Interests: None declared.

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INTRODUCTION

Cervical elongation has been previously noted in women with pelvic organ prolapse (POP). However, it has been described mainly in case reports or case series in postoperative patients who underwent various hysteropexy procedures for uterine prolapse, both vaginally and abdominally.[1–3] Interestingly, a graft was placed for suspension of the uterus in most of these patients. For example, cervical elongation has been described after uterosacral plication with sutures[4] and after synthetic[1,2] and porcine graft insertion.[3] These case series have reported a wide range for the incidence of cervical elongation after hysteropexy: 14% to 63%.[1,4] However, cervical elongation likely represents a clinical entity possibly associated with prolapse and not always related to graft use. A longer cervix can produce symptoms of pelvic pressure, heaviness, and bulge, similar to apical prolapse with or without a uterus in place. The Manchester-Fothergill procedure, which involves amputation of the cervix and shortening of suspensory ligaments, was first performed in 1888 by Donald in Manchester (United Kingdom) to treat cervical elongation; further modifications were then introduced by Fothergill.[5] This procedure continues to be performed today, in select cases of cervical elongation with minimal uterine prolapse, and is evidence that cervical elongation was recognized by the pioneers of surgical gynaecology. Currently, it is unknown whether cervical elongation is a clinical entity that is separate from apical prolapse or whether the two conditions always occur together. A recent MRI study comparing women with and without POP concluded that the cervix in women with uterine prolapse is 36.4% longer (8.6 mm) than that in women with normal pelvic support ($P < 0.001$).[6] Approximately 40% of women with POP were found to have cervical elongation; the extent of elongation increased with greater degrees of uterine descent.[6] Although MRI is quite precise for soft tissue measurements, it still has a margin of error intrinsic to any form of imaging. An anatomical study of cervical length in hysterectomy specimens of women with POP has, to the best of our knowledge, never been formally conducted. Our study aimed to investigate whether the average cervical length is longer in women with POP than in women with other benign uterine conditions necessitating hysterectomy.

METHODS

This was a prospective, pilot, case-control study. We sought to collect hysterectomy specimens in the operating room and perform measurements of cervical and uterine lengths in the pathology department, in addition to conducting the usual pathological investigations on the specimens after hysterectomy for benign indications. The pathology requisition completed in the operating room clearly indicated that the hysterectomy specimen was a part of the cervical elongation study, which triggered the staff pathologist to measure the specimen carefully according to a predetermined measurement protocol. Data on patient age, the indication for hysterectomy, and the presence or absence of prior cervical dysplasia were collected. We excluded the uteruses of women with a history of cervical dysplasia because we did not have access to full patient charts and we could not ascertain whether a cervical shortening procedure had been performed for dysplasia before hysterectomy. All patients were sufficiently symptomatic to undergo surgical management in the form of hysterectomy and concurrent procedures, whether for POP or other benign uterine conditions. Data on the severity of POP or specific patient symptoms were not collected for this study.

All measurements were obtained after the staff pathologist bivalved the uterus in the sagittal plane according to usual practice. Measurements were obtained as follows: cervical length was defined as the distance between the external and internal cervical os, and total uterine length was defined as the distance between the external cervical os and the midpoint of the fundus in the sagittal plane. As we had previously observed asymmetrical elongation of either the anterior or the posterior cervical lip, the pathologist was instructed to record the end of the longest cervical lip as the end of the external cervical os. A diagrammatic template was used to standardize the measurement process. All measurements were in centimetres. The ratio of cervical length to total uterine length was then calculated. Because we anticipated that most hysterectomies for benign indications without POP (non-POP) would be in women in the premenopausal age range and likely would be due to uterine hypertrophy or fibroids, we aimed to control for the enlargement of the uterus by using the ratio of cervical to uterine length rather than independent measurements.

Based on feasibility, we aimed to collect 50 uteruses from women with POP. An a priori power analysis based on the study by Berger et al.[6] showed that, with 50 uteruses from women with POP, to detect a mean difference in cervical length of 0.86 cm with standard deviation of 1.0, 21 uteruses from women without POP would be required to achieve 90% power with an alpha error set at 5%. We measured hysterectomy specimens consecutively until we achieved numbers satisfying the power analysis.

Demographic variables were summarized as mean and standard deviation, and comparisons between groups were