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The effect of hysterectomy on ano-rectal physiology

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Abstract Hysterectomy is associated with severe constipation in a subgroup of patients, and an adverse effect on colonic motility has been described in the literature. The onset of irritable bowel syndrome and urinary bladder dysfunction has also been reported after hysterectomy. In this prospective study, we investigated the effect of simple hysterectomy on ano-rectal physiology and bowel function. Thirty consecutive patients were assessed before and 16 weeks after operation. An abdominal hysterectomy was performed in 16 patients, and a vaginal procedure was performed in 14. The parameters measured included the mean resting, and maximal forced voluntary contraction anal pressures, the recto-anal inhibitory reflex, and rectal sensation to distension. In 8 patients, the terminal motor latency of the pudendal nerve was assessed bilaterally. Pre-operatively, 8 patients were constipated. This improved following hysterectomy in 4, worsened in 2, and was unchanged in 2. Symptomatology did not correlate with changes in manometry. Although, the mean resting pressure was reduced after hysterectomy (57 mmHg–53 mmHg, $P=0.0541$), the maximal forced voluntary contraction pressure was significantly decreased (115 mmHg–105 mmHg, $P=0.029$). This effect was more pronounced in those with five or more previous vaginal deliveries ($P=0.0244$, $n=9$). There was no significant change in the number of patients with an intact ano-rectal inhibitory reflex after hysterectomy. There was no change in rectal sensation to distension, and the right and left pudendal nerve terminal motor latencies were unaltered at follow-up. Our results demonstrate that hysterectomy causes a decrease in the maximal forced voluntary contraction and pressure, and this appears to be due to a large decrease in a small group of patients with previous multiple vaginal deliveries.

Key words Hysterectomy · Anal sphincter · Incontinence · Resting anal pressure · Maximum voluntary contraction

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Résumé L’hystérectomie est associée à une constipation sévère chez un sous-groupe de patientes et l’on a décrit un effet négatif de l’hystérectomie sur la motilité colique. On a également rapporté après hystérectomie le début d’un syndrome du côlon irritable et des troubles de la fonction urinaire. Dans une étude prospective, nous avons étudié l’effet d’une hystérectomie simple sur la physiologie ano-rectale et la fonction colique. 30 patientes consécutives ont été investiguées avant et 16 semaines après l’opération. Une hystérectomie abdominale a été réalisée chez 16 patientes et une hystérectomie par voie vaginale chez 14. Les paramètres mesurés comportent la pression de repos résiduelle, la pression de contraction volontaire maximale, le réflexe recto-anal inhibiteur, la perception de la distension rectale. Chez 8 patientes, le taux de latence du nerf honteux interne a été mesuré des deux côtés. En préopératoire, 8 patientes étaient constipées. A la suite de l’hystérectomie, la constipation s’est amendée chez 4, péjorée chez 2 et demeurée inchangée chez 2. La symptomatologie n’est pas corrélée avec des changements manométriques. Bien que la pression de repos soit réduite après hystérectomie (57 à 53 mmHg, $P = 0.0541$), la pression de contraction volontaire maximale est significativement abaissée (115 à 105 mmHg, $P = 0.029$). Cet effet est encore plus prononcé chez les patientes qui ont eu 5 ou plus d’accouchements par voie vaginale ($P = 0.0244$, $n = 9$). Il n’y a pas de changement significatif pour le nombre de patientes qui présentent un réflexe recto-anal inhibiteur intact après hystérectomie. Il n’y a pas de changement dans la perception de la distension rectale.

Introduction

Hysterectomy is the second most frequently performed major surgical procedure in the developed world [1], and although most operations are uneventful, the complication rate during hospital admission is approximately 7% [2, 3]. Aside from the initial complications, post-hysterectomy irritable bowel syndrome develops de novo in 13% of pa-

tients at 6 weeks [4]. A small group of patients also proceeded to develop idiopathic slow-transit constipation [5]. This is believed to be the result of damage to the autonomic nerve supply of the hindgut, resulting in functional obstruction [6], and may necessitate left hemicolectomy [7]. Furthermore, altered relaxation of the internal anal sphincter and decreased rectal sensation have been described following radical hysterectomy for carcinoma of the cervix [8]. Therefore, in order to evaluate fully the effect on ano-rectal physiology, we examined a group of patients, before and after simple abdominal and vaginal hysterectomy.

Patients and methods

Thirty patients were prospectively examined. Five gynaecologists participated in the study, and consecutive patients were referred. All patients gave informed consent, and permission was obtained from the ethics committee at Cork University Hospital. Each patient was assessed before, and 16 weeks after, hysterectomy. Exclusion criteria included: (1) previous ano-rectal surgery, (2) neurological disorders, (3) faecal incontinence, and (4) active ano-rectal disease, such as haemorrhoids or anal fissures. Patients with neoplasia were also excluded, except those with cervical intra-epithelial neoplasia.

A detailed questionnaire was completed before each visit, and a full examination was routinely performed. This involved details of bowel function, medications, and previous surgery, including all obstetric treatment and deliveries.

Five patients were classified as having constipation (≤ 2 bowel movements per week, or straining at stool $>25\%$ of the time) and one as having diarrhoea (>21 movements per week, or loose watery stools $>25\%$ of the time) before surgery. No patient was taking anti-spasmodic, anti-diarrhoeal, or stool softening/bulking agents. The decision to perform vaginal or abdominal hysterectomy was made by the individual gynaecologist in consultation with each patient.

After screening, the patient was placed in the left lateral position and a standard rectal probe (Gaeltec, Isle of Skye, Scotland, UK) was inserted into the anal canal, and manipulated until the high-pressure zone was located. No bowel preparation was given beforehand. Mean resting anal pressure was taken as an average reading during a 30-s interval. The maximal pressure generated by forced voluntary contraction of the external anal sphincter was measured, and the highest of three separate recordings noted. The presence or absence of the recto-anal inhibitory reflex was determined in standard fashion [7]. Rectal sensation was measured using an air-filled, intra-rectal balloon. The lowest of three volumes required to produce a sensation of gas and a desire to defecate was recorded.

The terminal motor latency of the pudendal nerve was measured bilaterally in eight patients using a St. Marks pudendal nerve electrode (Dantec, Bristol, UK).

Results

The median age was 46 years (range 30–64). Sixteen patients had an abdominal, and fourteen had a vaginal hysterectomy, with preservation of ovarian function. The most frequent indications for operation were abnormal bleeding (40%), chronic pelvic pain (30%) and leiomyomas (14%). Age showed a negative correlation with mean resting anal pressure (correlation coefficient, $r=-0.4241$; $P=0.019$), but not with maximal forced voluntary contraction anal pressure (correlation coefficient, $r=-0.24$; $P=0.19$). The patients who had a vaginal hysterectomy were significantly

older (mean age 44 years) than those who had an abdominal hysterectomy (mean age 54 years). However, there was no difference between the groups regarding the number of vaginal deliveries, or the mean resting, or forced voluntary contraction anal pressures.

Seventeen patients reported an unchanged bowel pattern at follow-up. In nine, there was a slight increase in the frequency of bowel motions, and a decrease in four. Only one patient required stool softening agents post-operatively.

The mean resting anal pressure was unchanged by hysterectomy, but the forced voluntary contraction anal pressure was significantly reduced at 16 week (115 mmHg–105 mmHg, $P=0.029$). This effect was due to a large decrease in nine patients with a history of five or more vaginal deliveries. In this group, the mean drop in forced voluntary contraction pressure after hysterectomy was 21 mmHg (112 mmHg–91 mmHg, $P=0.048$). In those who had had fewer than five vaginal deliveries, the mean drop in forced voluntary contraction pressure was 3 mmHg (115 mmHg–112 mmHg, not significant). There was no difference between these two groups regarding the age of the patients or the number who had a vaginal hysterectomy (4/9 and 10/21), or those who had an abdominal hysterectomy (5/9 and 11/21). The number of vaginal deliveries did not correlate with the mean resting (correlation coefficient, $r=0.21$) or maximal forced voluntary contraction pressures (correlation coefficient, $r=-0.027$).

The threshold volume and the urge volume were unchanged at follow-up. The terminal motor latency of the pudendal nerve was not effected by hysterectomy, and no difference was found in the number of patients with an intact recto-anal inhibitory reflex.

Statistical analysis

Correlation coefficients were calculated by linear regression analysis and ANOVA. Paired, and unpaired, Student's *t*-tests were used to compare variables between the various groups, and significance was set at $P \leq 0.05$.

Discussion

Pelvic surgery can damage the autonomic innervation of organs leading to dysfunction of the urinary bladder [9] and, in a small group of patients, to intractable constipation [5, 6]. Hysterectomy has been reported to result in increased rectal sensitivity [4], and impaired motility of the distal sigmoid colon has also been described [7]. In association with abnormalities of bladder function, this is most likely due to damaged fibres of the inferior hypogastric plexus.

It is believed that traction injury to the parasympathetic nerves (S2, S3 and S4) lying lateral to the vaginal fornix, and in the broad ligament of the uterus, is responsible for post-hysterectomy constipation [10]. Although cases of faecal incontinence and rectal prolapse have been reported [11],

no adverse effects on the pudendal nerve-innervated, external and sphincter mechanism have yet been described [12].

In this study, we found a significant decrease in the maximal forced voluntary contraction pressure, generated by the external and sphincter, at 16 weeks. This was due to the large decrease recorded for nine patients who had five or more previous vaginal deliveries. The mechanism responsible may be direct trauma to the external and sphincter at the time of operation, or damage to the S₃ and S₄ nerves supplying the puborectalis part of the external sphincter. It is worth noting that the external urethral sphincter, which is innervated by the pudendal nerve, is particularly susceptible to injury following hysterectomy [9, 13]. In this study, no patient reported urinary incontinence, and we found no difference in the terminal motor latency of the pudendal nerve at follow-up. The resting anal pressure in our study showed a negative correlation with age, and in contrast to previous reports, was unchanged following hysterectomy [8].

In the past, hysterectomy has been associated with the onset of irritable bowel syndrome in up to 13% of cases [4], and we found a significant change in bowel pattern at 16 weeks in 13 of our patients. In agreement with previous reports, rectal sensitivity was unchanged following hysterectomy [10]. It has been suggested that hysterectomy may have a greater effect on the act of defecation than on colonic motility, as up to 25% of patients report increased straining at stool at follow-up [14]. No patient in this study developed faecal incontinence and the number of patients with an intact recto-anal inhibitory reflex remained the same at follow-up.

Although no patient in this study developed faecal incontinence, we believe that hysterectomy may have an adverse effect on the external sphincter mechanism in a subgroup of patients. It appears that patients with a history of multiple vaginal deliveries are more prone to external sphincter injury after hysterectomy. The mechanism remains unclear, but the terminal motor latency of the pudendal nerve seems to be unaffected. This appears to indicate either direct trauma to the sphincter itself, or to the nerves supplying the puborectalis.

In summary, we have demonstrated that following hysterectomy there is a decrease in the maximal pressure gen-

erated by the external anal sphincter. This effect is pronounced in a small group of patients with previous multiple vaginal deliveries. Although this decrease did not have any adverse effect at 16 weeks, it may have a detrimental effect on those patients with an already compromised sphincter.

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