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Correlation between findings of nuclear magnetic resonance and 3D anorectal ultrasound in patients with suspected deep endometriosis

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ABSTRACT

Introduction: Endometriosis is defined as endometrial glands and stroma that occur outside the uterine cavity. Although not malignant, ectopic endometrial tissue and the resulting inflammation can cause dysmenorrhea, dyspareunia, chronic pain, and infertility. The diagnostic imaging tests most used are nuclear magnetic resonance imaging (NMR) and ultrasonography (USG).

Methods: Correlate the findings of three-dimensional anorectal ultrasound with the NMR findings of the pelvis with intestinal preparation in women with deep endometriosis, through a retrospective, observational, cross-sectional study, evaluating 63 female patients with suspected deep endometriosis with probable involvement intestinal. The evaluation period was from March 2016 to April 2018. Statistical analysis was performed using the kappa agreement to assess the degree of agreement between 3D NMR and USG in relation to the degree of infiltration in the rectal muscle layer, with a confidence interval of 0.272–0.579, $p < 0.001$.

Results and conclusion: According to the results presented, three-dimensional anorectal ultrasonography proved to be a good diagnostic test in the evaluation of the middle and posterior compartments of deep lesions of endometriosis, and there was a correlation between the NMR findings of the pelvis with intestinal preparation in relation to injuries that invade the muscularis propria of the rectum.

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Correlação entre achados de ressonância magnética nuclear e ultrassonografia anorretal 3D em pacientes com suspeita de endometriose profunda

Palavras-chave:
Endometriose
Ressonância nuclear magnética
Ultrassonografia anorretal 3D
Endometriose intestinal

RESUMO

Introdução: A endometriose ’e definida como glândulas endometriais e estroma que ocorrem fora da cavidade uterina. Embora na˜o maligno, tecido endometrial ectópico e a inflamaça˜o resultante podem causar dismenorreia, dispareunia, dor crônica e infertilidade. Exames de diagnóstico por imagem mais utilizados são Ressonância Nuclear Magnética e ultrassonografia.

Métodos: Correlacionar os achados da ultrassonografia anorretal tridimensional com os achados da ressonância magnética nuclear de pelve com preparo intestinal em mulheres portadoras de endometriose profunda, através de um estudo retrospectivo, observacional, transversal, avaliou 63 pacientes do sexo feminino com suspeita de endometriose profunda com provável acometimento intestinal. O período de avaliação foi Março de 2016 a Abril de 2018. Foi realizada análise estatística por meio do Coeficiente de Concordância de Kappa para se avaliar o grau de concordância entre RNM × USG 3D em relação ao grau de infiltração na camada muscular retal com cálculo de intervalo de confiança de 0,272–0,579; $p < 0,001$.

Resultados e conclusão: Segundo os resultados apresentados a ultrassonografia anorretal tridimensional mostrou-se um bom exame diagnóstico na avaliação dos compartimentos médio e posterior de lesões profundas de endometriose e há correlação entre os achados da ressonância magnética nuclear de pelve com preparo intestinal em relação a lesões que invadem a muscular própria do reto.

Introduction

Endometriosis is defined as the presence of endometrial glands and stroma outside the uterine cavity. They are usually located in the pelvis, but can occur in several places, including the intestine, diaphragm, and pleural cavity. Studies report that between 15% and 30% of women with endometriosis will have a profound infiltrative disease,[1–3] and pregnancy can often be difficult and challenging. One study reported an incidence of intestinal involvement of 3%–37%,[1] while other authors reported an incidence of up to 80%.[4] The most common areas of intestinal involvement are the rectum and sigmoid colon. When the gastrointestinal tract is involved, the foci are more commonly located in the sigmoid and rectum, starting from the uterosacral ligament and/or the rectovaginal septum.[1] The imaging exam must be able to indicate the number of foci present, the size and depth of the lesion, as well as its distance from the anal margin.[5,6] With this information, it is possible to determine the most efficient surgical procedure for each case.

Currently, the main role of nuclear magnetic resonance imaging (NMR) in deep pelvic endometriosis lies in the diagnosis and thorough lesion mapping.[7] Anorectal ultrasonography has high sensitivity and specificity (97%–100% and 97%–100%, respectively) for the diagnosis of rectal involvement in patients with endometriosis.[8] It also allows measuring the distance from the endometriotic focus to the sphincter apparatus, suggesting which anastomosis will be the most appropriate in each case, as well as the possible need for a stoma. Therefore, it is possible to plan the appropriate surgical approach for each case.[9]

Objective

Correlate the findings of three-dimensional anorectal ultrasound (USG) with the findings of pelvic NMR with intestinal preparation in women with deep endometriosis.

Methods

This was a retrospective, observational, cross-sectional study that evaluated 63 female patients with suspected deep endometriosis and probable intestinal involvement. The evaluation period was from March 2016 to April 2018. Patients were selected at gynecology service that is a reference in the screening of patients with deep endometriosis for colorectal surgery.

The patients were initially submitted to three-dimensional anorectal USG with the BK device with three-dimensional acquisitions. After fasting for six hours, patients underwent a rectal enema with 125 mL of sodium phosphate two hours before the exam and another one hour before the ultrasound. The patients were placed in lateral decubitus (Sims’ position) and underwent anesthetic sedation performed by an anesthesiologist with propofol and 1 mL of fentanyl. The following variables were analyzed in 3D rectal USG: lesions in perirectal fat, invasion of the muscularis propria, and distance from the lesion to the sphincter apparatus.

The resonance was performed by a radiologist trained in the assessment of patients with deep endometriosis with a high field device (1.5 T) with multiplanar slices of high spatial resolution for fat-suppressed T1- and T2-weighted imaging. All patients underwent intestinal preparation, and vaginal and rectal contrasts were used. The NMR assessed the presence of lesions in the bladder, cervix, uterus, ovaries, round and uterosacral ligaments, rectum, and sigmoid. Patients who did not undergo one of the exams, those in whom cancer was detected at any time during the evaluation, or those who did not have a properly completed medical record were excluded.

An Excel spreadsheet was used for data analysis. The data evaluated on NMR were the presence of lesions in the bladder, cervix, right ovary, left ovary, round ligament, uterosacral ligament, and uterus, and description of the location and size of the lesion in sigmoid and rectum. In 3D anorectal USG, the presence of the size of the lesion, the location of the lesion and whether it invaded the muscularis propria, and the distance from the lesion of the sphincter were assessed.

Statistical analysis was performed using the kappa agreement coefficient to assess the degree of agreement between NMR and 3D USG regarding the degree of infiltration in the rectal muscle layer with a confidence interval of 0.272–0.579 ($p < 0.001$). The calculation was performed using an agreement analysis device available at www.lee.dante.com.br/pesquisa.html.

Results

NMR indicated that six (9.5%) patients had lesions suggestive of bladder endometriosis, one (1.5%) patient had a lesion in the cervix, eight (12%) patients had endometrioma in the left ovary, 11 (17%) patients had endometrioma in the right ovary, eight (12%) patients had lesions in the round ligament, 11 (17%) patients had lesions in the uterosacral ligament, 25 (39%) had lesions suggestive of adenomyosis, 30 (47%) patients had rectal lesions, and 16 (25%) had sigmoid lesions.

The analysis of 3D anorectal USG data indicated that nine (14.28%) patients had no lesions, 20 (31.74%) patients had lesions of the perirectal fat, and 28 (44.44%) patients had lesions that invaded the muscularis propria. In this analysis, six (9.52%) patients were excluded from the study due to lack of data.

When comparing NMR with 3D USG, it was observed that NMR diagnosed 20 (31%) patients without lesion suggestive of endometriosis, while anorectal USG identified only nine (14%) patients. When comparing the presence of lesion until the perirectal fat, USG identified 20 (31%) patients, while NMR identified 12 (19%) patients. In the comparison between lesions that invaded the muscularis propria, 3D USG diagnosed 28 (44%), while NMR diagnosed 30 (47%) patients.

Statistical analysis was performed using Kappa's Agreement Coefficient to assess the degree of agreement between NMR and 3D USG regarding the degree of infiltration in the rectal muscle layer.

The kappa value can be interpreted as follows: <0 — no agreement; 0.0–0.19 — poor; 0.20–0.39 — regular; 0.40–0.59 — moderate; 0.60–0.79 — substantial; 0.80–1.0 — near perfect agreement

In patients without lesions, the kappa value was 0.349 (95% CI 0.542–0.155); in the evaluation of lesions in perirectal fat, the kappa value was 0.064 (95% CI: 0.119 to −0.248) and, in lesions that invaded the muscularis propria, the kappa value was 0.864 (95% CI 1–0.611).

Discussion

Endometriosis is characterized by the presence of endometrial tissue outside the uterine cavity. The theory of retrograde menstruation is accepted as the most likely etiology, but there appears to be other etiological associations, such as molecular biology.[10] It affects 10%–15% of women of childbearing age. Intestinal involvement occurs in 3%–7% of these women, with the rectum, sigmoid, or both affected in 90% of these cases.[11] The clinical picture is varied; the main complaints, when present, are dyspareunia, dysmenorrhea, chronic pelvic pain, and infertility.[10]

The definitive diagnosis is made through a surgical procedure with resection of the lesion and subsequent anatomopathological analysis.[10] Some studies indicate pelvic ultrasound as a first-line diagnostic test, leaving NMR and endoscopic USG of the rectosigmoid as second and third lines of diagnosis,[12] although some systematic reviews demonstrated that both NMR and transvaginal pelvic USG have similar sensitivity and specificity in the diagnosis of deep endometriosis.[13]

Some studies[14] compared the accuracy of two-dimensional *vs.* three-dimensional USG diagnosis and showed no significant difference between positive and negative predictive values; however, this comparison was made with the use of transvaginal USG rather than rectal USG.[12]

Surgical treatment of deep endometriosis involves surgical techniques known as muscle layer dissection (shaving), disc resection, and intestinal resection (segmental or patch). The advantages of the first and second techniques include a procedure with shorter operative time, shorter hospital stay, and fewer complications. In turn, the resection technique can lead to longer surgical time and hospital stay, paralytic ileum, and intestinal complications such as fistulas. The choice of the surgical technique depends on the number of lesions observed in imaging exams, their location, and the surgeon's experience; however, the shaving technique is chosen whenever possible, especially in cases of single and small lesions without invasion of the submucosa.[12]

Recent systematic reviews indicated that the sensitivity of transvaginal USG ranges from 73.3% to 98.1%, while the NMR sensitivity varies from 73.3% to 100%. The specificity of transvaginal USG ranges from 66.7% to 100%, while that of NMR ranges from 50% to 100%.[13] In the present study, 3D anorectal USG had almost perfect agreement, according to the kappa coefficient, when comparing lesions that invade the muscularis propria; however, such expressive agreement values were not observed in patients without lesions or those with lesions in the perirectal fat. In this service, 3D anorectal USG showed a significant correlation in the diagnosis of deep intestinal pelvic endometriosis and involvement of the muscularis propria.

Despite the small number of studies retrieved in the international literature, 3D anorectal USG, despite requiring further studies, can be used as a parameter of choice for surgical treatment, and can be used (in combination with the experience of the service/surgeon and/or associated with other imaging exams such as NMR) to define the best surgical technique (shaving or segmental resection).[12]

Conclusions

3D anorectal USG is a good diagnostic test for the evaluation of the middle and posterior compartments of deep endometriosis lesions; a correlation was observed between the findings of NMR of the pelvis with intestinal preparation in relation to injuries that invade the muscularis propria.

Conflicts of interest

The authors declare no conflicts of interest.

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