Pelvic Physical Therapy Distance Journal Club
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Use of the free endometriosis risk advisor app as a non-invasive screening test for endometriosis in patients with chronic pelvic pain and/or unexplained infertility. Nezhat C, Armani E, Chen HCC, et al. J Clin Med 2023; 12:5234. Doi.org/10.3390/jcm12165234.

Introduction: In September of 2023, Michelle Spicka presented an article to the Distance Journal Club on pre-operative predictors for the presence of endometriosis. The conclusion of the article Michelle presented was that there **are** distinct pain patterns that are highly predictive of endometriosis.
The study I am presenting by Nezhat, et al. builds on that topic and demonstrates that use of a non-invasive screening tool to identify increased risk of endometriosis is possible with an app that was released in 2019 for free use.

Aim/Primary Aim:
This study aimed to evaluate the utility of the Endometriosis Risk Advisor (EndoRA) mobile application in screening for endometriosis in patients with chronic pelvic pain and/or unexplained infertility.

Study Design/Study Format:
Retrospective cross-sectional study

A study of this design measures the outcome (ability of the app to determine endo risk) and the exposures (findings of the diagnostic surgical laparoscopy) at the same time and then looks back on historical data to perform the statistical analysis. For perspective, in the pyramid of quality of evidence, case studies are at the bottom with the lowest level of evidence and randomized control trials are at the top with the highest level of evidence. A cross sectional study is just above case studies.

Methods:
The study consisted of 293 patients who met specific criteria: they were English-speaking individuals with chronic pelvic pain and/or unexplained infertility, owned smartphones, and had no prior diagnosis of endometriosis.
The study participants were between the ages of 17 and 49 and the average age was 36 years old and they had not received a prior diagnosis of endometriosis.
Pelvic pain was defined as pain experienced in the lower abdominal and pelvic regions, which encompassed symptoms like dysmenorrhea, dyspareunia, dyschezia, and chronic pelvic pain.
The app used an AI-based algorithm. A series of questions were asked that focused on symptoms, family history, psychiatric history, past medical history, fertility issues, and previous fertility testing.

Intervention:
The patients completed the questionnaire on the EndoRA app and then underwent diagnostic laparoscopy. Statistical analysis of the app score and histopathology was completed.

Results:
The results demonstrated that the EndoRA score exhibited a high sensitivity of 93.1% but a low specificity of 5.9% in detecting endometriosis. The positive predictive value was 94.1%, while the negative predictive value was 5.0%, the positive likelihood ratio was 0.98 and the negative likelihood ratio was 1.17, and lastly the diagnostic odds ratio was 0.84.

The summary/interpretation of all of the statistics: The questionnaire is more accurate in patients whose disease is more severe.

Discussion:
1. The EndoRA mobile application is specifically designed to be useful for high-risk groups rather than the general population.
2. The app had a high specificity for identifying patients with stage III/IV endometriosis.
3. Biopsies were taken to use histopathology to determine the presence of and confirm the diagnosis of endometriosis, even in patients with stage I or no obvious endo lesions
4. Comprehensive surgical evaluation was completed by highly trained MIGS surgeons familiar with endometriosis excision. The entire abdominal and pelvic cavities were thoroughly evaluated for any obvious or suspicious lesion(s) related to endometriosis, deep infiltrative fibrosis, or adhesions secondary to endometriosis. Special attention was given to the peritoneal and omental surfaces, bilateral hemidiaphragm, liver, gallbladder, stomach, small and large intestines, uterus, bilateral adnexa, and pelvic sidewalls
5. The app is non-invasive, it is free, and easily accessible.
6. With use of an app, there is potential to streamline evaluation and treatment processes, and reduce delay in time to diagnosis.
7. The use of an app may in power people to discuss the findings with their physician and seek more timely care which can improve their outcomes and overall well-being.
8. The app may assist PCP/family physicians where specialized endometriosis specialists and diagnostic/operative video-laparoscopy are not easily accessible and prompt an earlier referral to a specialist.
9. The authors state the app could decrease the need for other imaging and blood work test thereby reducing costs.

Strengths
1. The study evaluated the screening utility of the EndoRA mobile application by comparing it to the gold standard of histopathology for diagnosing endometriosis in patients with chronic pelvic pain and/or unexplained infertility.
2. Sensitivity, specificity, and positive/negative predictive values, positive/negative likelihood rations, and diagnostic odds ratios were determined.

3. The EndoRA application exhibits a higher screening value for patients with stages III and IV endometriosis, as it was able to screen these cases with a higher degree of accuracy (sensitivity: 96.8%, specificity: 100%, PPV: 100%) versus patients with stages I and II endometriosis (a strength and weakness).
4. The development of the app underwent a thorough and comprehensive process involving study authors, independent endometriosis specialists, engineers, and AI (Artificial Intelligence) experts.
5. The EndoRA application underwent validation prior to use in the study to ensure its reliability and accuracy and was described in detail in the article.
6. This is a published article detailing the use of artificial intelligence and machine learning in screening for endometriosis.

Weaknesses:
1. A big limitation is the presence of selection bias--the patient is included in the study were already referred to the authors for surgical evaluation. This may have affected the distribution of the scores and lead to fewer people with low risk EndoRA scores.
2. Another weakness is the study design and no control group.
3. While some of the statistic support the utility of the app, they are others that are not significant or powerful and detract from the usefulness of the app.
4. The authors emphasize that the endo app is specifically designed to be used for high risk groups rather than the general population.
5.

Conclusion/Summary:
Overall, the findings suggest that the EndoRA app can serve as a valuable screening tool for high-risk individuals, enabling them to identify themselves as being at an increased risk for endometriosis and seek earlier care from a qualified provider.
The opportunity exists for fine-tuning the algorithms and machine learning models can be explored as AI technology advances.

Clinical Application
Use of the screening app can raise awareness for patients and providers and enable timely access to diagnosis and treatment of endometriosis.
This is a tool that any pelvic PT can educate their patients to use and to guide their decision making re: need to seek out an endometriosis specialist.

List discussion questions
Do you refer patients to GYN for consultation to rule in/out endometriosis?
Have you developed your own "screening" methodology?
What identifiers do you rely on to refer a patient to GYN for consultation to rule in/out endometriosis?
At you think this app could be used clinically?
Would you share this study/summary/the app with providers including pediatricians, family medicine, and local gyn? Perhaps, a local school nurse

Other References:

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