Toward a Personalized Pessary for Women Experiencing Pelvic Organ Prolapse

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- **Introduction:** 25% of women, and 50% of women over 80, will suffer from pelvic floor disorders, such as incontinence and Pelvic Organ Prolapse (POP). POP is a condition that involves the downward descent of the pelvic organs, causing pelvic pressure and urinary incontinence. Pessaries, are inserted into the vagina to support its internal structure. However, their "one-size fits all" approach is outdated and have low compliance. It is reported that 56% of patients will develop complications with long term use of pessaries including lacerations and open sores. There is a clear unmet need to improve the current pessary designs and offer personalized solutions to account for each women's unique condition.
- **Objective:** This study aimed to conduct a literature review on the available pessaries with the goal of identifying the factors that are attributed to their failure rate. Shapes and resting positions of pessaries will be examined, and a recommendation will be provided to increase the compliance. The goal is to propose a novel pessary design that takes account of the unique anatomy of each woman.
- **Methods:** The review was conducted using the Medline, and Cochrane Central Register of Controlled Trials (CENTRAL), emphasizing anatomical landmarks within the vaginal canal. The results obtained from this analysis, including identifying the resting place of the pessary as well as generating a 3D reconstruction of the patient's vaginal canal, will be utilized to create a personalized pessary that is better suited to individual's unique anatomy.
- **Results:** Pessary expansion toward the lateral walls of the vagina may lead to a decreased chance of failure. It has been demonstrated that the proposed pessary can redistribute the received abdominal and intravaginal pressure across the lateral walls by adjusting its parameters according to each patient's vaginal dimensions. Controlling the direction of expansion can also reduce vertical displacement and alleviate vaginal irritation.
- **Conclusions:** Changing the underlying infrastructure of pessaries and, therefore, their design could improve their efficacy, provide more comfort for patients, and even prevent or delay surgical procedures. The proposed design, coupled with the novel technology for measuring pelvic floor dimensions, provides a systematic approach for designing personalized pessaries.

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