UTERINE PROLAPSE REPAIR SURGERY: A FINITE ELEMENT ANALYSIS

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The uterosacral (USLs) and cardinal ligaments (CLs) are the primary pelvic structures that provide apical support to the upper vagina and uterus [1]. The impairment of these connective tissues is strongly associated with pelvic organ prolapse (POP), namely the uterine prolapse, that has long been studied [2]. The prevalence of POP, which is now up to 41.1%, is likely to increase due to improvements in overall healthcare and increase life expectancy [3].The synthetic implants are used for the reconstructive surgery of POP, but severe complications associated with their use have been reported, mainly related to their mechanical properties.
In this study, we mimicked a transvaginal reconstructive surgery to repair/replace the apical ligaments (USLs) and CLs), by modeling, after their impairment and/or total rupture, respectively. The implants to reinforce/replace these ligaments were built based on literature specifications and their mechanical properties were obtained through uniaxial tensile tests. Additionally, the effect of mesh anchoring technique (simple stich and continuous stitch) was analyzed.
The absence/presence of the synthetic implant was simulated when total rupture of the CLs and USLs occurs, causing a variation of the vaginal displacement (9% for the CLs and 27% for the USLs). The simulations also showed that there was a variation of the supero-inferior displacement of the vaginal wall between different anchoring techniques, being approximately of 10% for the simulation USLs and CLs implant.
The simulation was able to mimic the biomechanical behavior of the USLs and CLs, in response to different anchoring techniques, which can be help improving the outcomes of the prolapse surgery in the future.

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