

Original article

Cystoscopic evaluation 6-months after anterior vaginal mesh repair:

A cross-sectional study

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Abstract:

Introduction: Intravesical mesh erosion is a serious complication after transvaginal mesh prolapse repair. **Objective:** To study abnormal intravesical findings related to anterior vaginal mesh repair and factors associated with these abnormal findings in patients without urinary symptoms. **Methods:** We conducted a cross-sectional study in patients that had undergone anterior vaginal mesh repair at least 6 months before enrollment. Demographic and clinical data were collected. Urinalysis and routine pelvic examination were performed and rigid cystoscopy using a 30-degree lens was conducted to determine if mesh erosion was present. Abnormal intravesical findings such as mucosal inflammation, mass, and stone were recorded. **Results:** One hundred subjects were enrolled. The median age was 68 years old (range 43 to 84). Three-fourths of the patients were pre-operatively diagnosed with advanced stage pelvic organ prolapse. No intravesical mesh erosion or abnormal intravesical finding related to anterior vaginal mesh repair was observed (95% confidence interval: 0% to 3.7%). Two subjects had abnormal findings including Hunner's ulcers with glomerulation and a bladder diverticulum with large trabeculae. **Conclusions:** There were no intravesical mesh erosion and abnormal intravesical finding related to anterior vaginal mesh repair. Accordingly, the routine cystoscopy in post-operative anterior vaginal mesh repair patients without urinary symptoms is not necessary.

Keywords: ● Anterior vaginal mesh repair ● Cystoscopy ● Mesh erosion

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นิพนธ์ต้นฉบับ

การส่องกล้องตรวจในกระเพาะปัสสาวะหกเดือนภายหลังการผ่าตัดใส่ตาข่ายเพื่อซ่อมแซมช่องคลอดด้านหน้า-การศึกษาแบบตัดขวาง

พิชัย ลีระศิริ บุษรัญญา พุทธชนะพิทักษ์ พัทยา เสงี่ยม และ ชุตินันท์ อลัมภินวงศ์

หน่วยขับถ่ายปัสสาวะผิดปกติและอวัยวะเชิงกรานหย่อนในสตรี คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล

บทคัดย่อ

บทนำ ภาวะตาข่ายโผล่ในกระเพาะปัสสาวะเป็นภาวะแทรกซ้อนรุนแรงที่พบได้หลังการผ่าตัดใส่ตาข่ายเพื่อซ่อมแซมผนังช่องคลอด **วัตถุประสงค์** เพื่อศึกษาสิ่งผิดปกติภายในกระเพาะปัสสาวะที่สัมพันธ์กับการผ่าตัดใส่ตาข่ายเพื่อซ่อมแซมช่องคลอดด้านหน้า และปัจจัยที่เกี่ยวข้องในผู้ป่วยที่ไม่มีอาการผิดปกติของระบบทางเดินปัสสาวะส่วนล่าง **วิธีการ** ทำการศึกษาแบบตัดขวางในผู้ป่วยที่ได้รับการผ่าตัดใส่ตาข่ายเพื่อซ่อมแซมช่องคลอดด้านหน้าตั้งแต่ 6 เดือนขึ้นไป โดยเก็บข้อมูลพื้นฐาน ข้อมูลทางคลินิก ตรวจปัสสาวะ ตรวจภายใน และส่องกล้องในกระเพาะปัสสาวะด้วยกล้องชนิดแข็ง 30 องศา เพื่อดูภาวะตาข่ายโผล่และความผิดปกติอื่นๆ ในกระเพาะปัสสาวะ **ผลการศึกษา** ผู้ป่วย 100 คน มีค่ามัธยฐานของอายุ 68 ปี (43 ถึง 84 ปี) ร้อยละ 76 ของผู้ป่วยมีระดับการหย่อนของช่องคลอดด้านหน้าก่อนผ่าตัดระยะที่ 3-4 ไม่พบภาวะตาข่ายโผล่ในกระเพาะปัสสาวะหรือความผิดปกติที่สัมพันธ์กับการผ่าตัด (ค่าช่วงความเชื่อมั่นที่ระดับร้อยละ 95: ร้อยละ 0 ถึง 3.7) แต่พบแผล Hunner และ glomerulation 1 ราย พบกระเพาะปัสสาวะโป่งพองและมี trabeculae เพิ่มขึ้น 1 ราย **สรุป** ไม่พบภาวะตาข่ายโผล่ในกระเพาะปัสสาวะหรือความผิดปกติที่สัมพันธ์กับการผ่าตัด ดังนั้นอาจไม่จำเป็นต้องส่องกล้องในกระเพาะปัสสาวะหลังการผ่าตัดใส่ตาข่ายในผู้ป่วยที่ไม่มีอาการของระบบทางเดินปัสสาวะส่วนล่างทุกราย

คำสำคัญ: ● การผ่าตัดใส่ตาข่ายเพื่อซ่อมแซมช่องคลอดด้านหน้า ● การส่องกล้องตรวจในกระเพาะปัสสาวะ ● ภาวะตาข่ายโผล่
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ผู้เขียนหลัก: พญ.ชุตินันท์ อลัมภินวงศ์ หน่วยขับถ่ายปัสสาวะผิดปกติและอวัยวะเชิงกรานหย่อนในสตรี คณะแพทยศาสตร์ศิริราชพยาบาล มหาวิทยาลัยมหิดล

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Introduction

Pelvic organ prolapse (POP) is defined as the descent of one or more of the uterus, the anterior vaginal wall, the posterior vaginal wall, and the posthysterectomy vaginal cuff from the vagina^{1,2}. Anterior vaginal wall prolapse is reported to be the most prevalent pelvic organ prolapse among female population³. This is probably the reason why anterior colporrhaphy constitutes up to 80% of vaginal surgeries⁴. Unfortunately, anterior vaginal native tissue repair has a high failure rate of 40%. Moreover, 13% of the patients may require a repeated surgery within five years and approximately 29% will require a second operation during their lifetime^{4,5}. As a result, vaginal mesh surgery has been developed to support and/or compensate the weak and torn fascial tissue of the vagina to prevent POP recurrence. The mesh or graft stimulates the formation of fibroblasts and connective tissue growth into the graft, creating a stronger supporting structure and reducing the rate of POP recurrence^{1,6-8}. In a previous study, 30-60% of patients having undergone anterior vaginal native tissue repair for anterior wall prolapse required another surgery, doubling the rate of those undergoing vaginal mesh repair (RR 2.0, 95%CI: 1.3 to 3.1)⁹.

Although vaginal mesh repair has a significantly higher success rate when compared to the native tissue reconstruction, mesh-related complications remain one of the common postoperative sequelae. These include vaginal mesh extrusion (10.3%), dyspareunia (9.1%), chronic granulation tissue (7.8%), infection, pelvic pain, vaginal bleeding, and organ perforation^{4,10-12}. Vaginal mesh extrusion, defined as the gradual passage of the mesh into the vaginal lumen, is the most common mesh-related complication often encountered during the first four months following the repair¹³. It can easily be detected by vaginal palpation and examination, and usually does not require any aggressive treatment. According

to the 2016 annual report of the Urogynecology Unit, Department of Obstetrics and Gynecology, Faculty of Medicine Siriraj Hospital, anterior vaginal mesh repair was performed in 63 out of 91 patients (69%) undergoing vaginal reconstructive procedures for anterior vaginal prolapse. A very high objective cure rate of approximately 98% was achieved (point Ba at or above hymen). Although the rate of vaginal mesh extrusion was as high as 23%, only 5.3% of the patients were symptomatic and required further outpatient treatment. Apart from vaginal mesh extrusion, a more serious mesh-related complication, particularly mesh erosion or perforation into the adjacent viscera such as bladder and bowel, has occasionally been reported. Possible mechanisms accounted for intravesical mesh perforation include intraoperative placement of the mesh or suture through the bladder wall at the time of vaginal repair with failure to diagnose during intraoperative cystoscopy, transmural placement of the mesh within the detrusor muscle with subsequent erosion into the bladder mucosa, and placement of the mesh with excessive tension onto the bladder wall causing subsequent perforation into the bladder mucosa¹⁴.

Clinical manifestations of mesh-related complications vary depending on organs involved. Vaginal mesh extrusion may result in abnormal discharge, vaginal bleeding, vaginal pain, and/or dyspareunia. Symptoms associated with intravesical mesh perforation include painful voiding, urinary frequency, urgency, hematuria, recurrent urinary tract infection, urinary calculi, and genitourinary fistulae. In 2008, Frenkl, et al. reported that patients with intravesical mesh perforation mostly became symptomatic at an average of 35 months, ranging from as early as 3 months up to 185 months after surgery¹⁴. Currently, there is limited data on the optimal cost-effective management of vaginal mesh extrusion. The management options should be based on the location of the extrusion and the magnitude of symptoms. Although

it is pragmatic to exclude simultaneous erosion into the urethra or bladder by cystoscopy in all cases of vaginal mesh extrusion, there is no published data on cystoscopic findings among urinary symptom-free patients. Hence, the incidence of intravesical mesh perforation in patients without urinary symptoms has never been reported. Therefore, the aim of this study is to find out the prevalence of intravesical mesh perforation and other relevant abnormal cystoscopic findings among patients without urinary symptoms having undergone anterior vaginal mesh repair.

Materials and methods

This is a cross-sectional study conducted on patients who underwent the trocar-based self-cut polypropylene anterior vaginal mesh repair for anterior vaginal wall prolapse at Urogynecology Unit, Siriraj Hospital between January 2009 and December 2016. The study protocol was officially approved by the institutional review board of the Faculty of Medicine Siriraj Hospital, Mahidol University. A total of 100 patients without urinary symptoms having undergone vaginal mesh repair procedure for at least 6 months prior to the study were enrolled. Those having conditions that could affect the cystoscopy procedure and findings including abnormal anatomy of the genitourinary tract, urethral stenosis, and coagulopathy were excluded. Participants were informed of the study protocol, details of office cystoscopy procedures, and possible adverse effects before giving the informed consent. Demographic data and information regarding clinical presentations were collected. These included age, body weight, height, BMI (body mass index), parity, menopausal status, hormone use, smoking history, underlying diseases, history of previous surgery, prolapse stage (according to Pelvic Organ Prolapse Quantification or POP-Q system), postoperative urinary and sexual symptoms,

and perioperative complications. Urinalysis was tested in all participants. After a thorough pelvic examination and POP-Q evaluation, an office cystoscopy was done with the application of 5% lidocaine gel to determine whether intravesical mesh perforation was present, and to find out any other abnormal cystoscopic findings, such as mucosal inflammation, suspicious mass, or stone. A 30° rigid office cystoscope with 2.9-mm inner diameter and 3.5-mm outer sheath (Karl Storz 26008 BA Hopkins II Forward-Oblique Telescope 30°) was used. An oral prophylactic antibiotic and NSAIDs were given to all participants after the procedure to prevent urinary tract infection and control pain. All data were collected in a case record form. If mesh perforation was observed, the details regarding the size and location were recorded according to the International Continence Society/ International Urogynecology Association (ICS/IUGA) joint terminology and classification of the complications¹⁵. Intravesical mesh perforation, if present, would require a complete removal of the mesh and concomitant bladder repair either vaginally, abdominally, or laparoscopically.

The sample size was calculated according to the 1% incidence of intraurethral mesh perforation after mid-urethral sling procedure reported by Frenkl, et al¹⁴. At 95% confidence level and 2% acceptable error, the total number of 96 cases was needed. Statistical analysis was performed using the PASW Statistics version 18.0 (SPSS, Inc., Chicago, IL, USA) for Windows. Continuous variables were expressed as mean \pm standard deviation (SD), or median. Categorical data were displayed as numbers and percentages. Chi-square test or Fisher's exact test was used to compare the differences of qualitative data. Independent t-test or Mann-Whitney U test was used to compare the differences of quantitative data. Statistical significance was determined as a *p*-value of less than 0.05.

Results

Of 100 patients having undergone anterior vaginal mesh repair, the mean age was 66.9 years old with the mean BMI of 25.3 kg/m². More than half of the patients were considered as obese (BMI \geq 25 kg/m²) according to the Asia-Pacific BMI guidelines¹⁶. Most patients were menopause (96%) and no longer sexually active (75%). Three-fourths of the patients were pre-operatively diagnosed with advanced stage pelvic organ prolapse (stage 3-4). During cystoscopic evaluation that was performed at least 6 months post-operatively, all advanced stage POP could be successfully corrected with anterior vaginal mesh repair (Table 1).

Office cystoscopy revealed no intravesical mesh perforation among all patients having undergone anterior vaginal mesh repair (95% confidence interval 0% to 3.7%). In addition, no mucosal inflammation, stone, mass, or foreign body was found during cystoscopy. Hunner's ulcers with glomerulation and bladder diverticulum with large trabeculation were demonstrated in 2 patients (Table 2).

Although no intravesical mesh perforation was found during cystoscopic evaluation, 20 asymptomatic patients were discovered with vaginal mesh extrusion. However, this could be uneventfully treated with either expectant management, vaginal estrogen, or outpatient mesh trimming.

Discussion

This study demonstrated that no intravesical mesh erosion was found after anterior vaginal mesh repair. Results from our study have confirmed the hypothesis that a routine cystoscopy to exclude intravesical mesh perforation after anterior vaginal mesh repair in patients without urinary symptoms is not necessary. According to the results from previous literatures, intravesical mesh perforation was only observed in patients with de novo urinary symptom¹⁷.

Table 1 Patient demographic and clinical characteristics

Characteristics	Values
Age (years)	66.9 \pm 8.1
Weight (kg)	60.5 \pm 9.9
BMI (kg/m ²)	25.3 \pm 3.7
Parity	3 (0-8)
Menopausal status	96 (96)
Active sexual intercourse	25 (25)
Underlying disease	
Diabetes mellitus	27 (27)
Hypertension	67 (67)
Dyslipidemia	52 (52)
Asthma	3 (3)
Cardiovascular disease	3 (3)
Hormone replacement therapy	9 (9)
Smoking	1 (1)
Preoperative POP stage:	
Stage 2	24 (24)
Stage 3-4	76 (76)
Postoperative POP stage	
Stage 0-1	69 (69)
Stage 2	31 (31)

Data are presented as mean \pm standard deviation (SD) or median (minimum-maximum) or number (%)

Table 2 Cystoscopic findings

Cystoscopic Finding	Values
Intravesical mesh erosion	0 (0)
Mucosal inflammation	0 (0)
Intravesical stone	0 (0)
Intravesical mass	0 (0)
Intravesical foreign body	0 (0)
Hunner's ulcer with glomerulation	1 (1)
Bladder diverticulum with trabeculae	1 (1)

Data are presented as number (%)

It is believed that the most common cause of intravesical mesh perforation after trocar-based anterior vaginal mesh repair is poor surgical techniques especially the lack of skills in tissue dissection with unrecognized intraoperative bladder injury during trocar insertion. In previous studies, perioperative bladder perforation was present in about 6-10% of the cases^{17,18}. The identifiable risk factors included history of previous vaginal surgeries and the surgeon's experience. Therefore, immediate postoperative cystoscopy is useful in early detection of bladder injuries and avoidance of additional complications.

Intravesical mesh perforation may occur years after the initial mesh surgery. In 2014, Tsia-Shu Lo, et al reported that intravesical mesh erosion may occur 12 years after the primary surgery¹⁷. In 2008, Frenkl, et al also demonstrated an average period of abnormal intravesical findings of 35 months (ranging 3-185 months) after surgery¹⁴. This might be due to excessive tension of the mesh arms being inserted through the obturator foramina causing continuing pressure onto surrounding tissues and the bladder wall which later resulted in tissue scarring, ischemia, and mesh perforation. Hence, it is recommended to follow the patients in a longer period and to monitor for any newly developed symptoms in order to promptly perform cystoscopy and to early detect these complications¹⁷. Our study does have some limitations. Since this is a cross-sectional study and the cystoscopy was done at different postoperative periods after vaginal mesh repair, the exact incidence of intravesical mesh perforation may not be confirmed.

Conclusion

No intravesical mesh erosion was found after anterior vaginal mesh repair. Routine cystoscopy to exclude intravesical mesh perforation following anterior vaginal mesh repair in patients without urinary symptoms is not necessary.

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Conflict of interest

The authors declare that they have no conflict of interest.

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