Case Report

Current Opinion in Gynecology and Obstetrics Ureteral Obstruction Secondary to Vaginal Implant

Levy G^{1*}, Beck A¹, Raz O² and Pansky M³

¹Division of Female Pelvic Medicine and Reconstructive Surgery, Department of Obstetrics and Gynecology, Assuta Ashdod University Hospital, Ashdod, Israel

²Department of Urology, Assuta Ashdod University Hospital, Ashdod, Israel

³Department of Obstetrics and Gynecology, Assuta Ashdod University Hospital, Ashdod, Israel

***Correspondence:** Gil Levy, Division of Female Pelvic Medicine and Reconstructive Surgery, Department of Obstetrics and Gynecology, Assuta Ashdod University Hospital, Ashdod, Israel, Tel: +972-52-3430545; E-mail: 2gillevy@gmail.com

Received date: April 10, 2019; Accepted date: May 10, 2019; Published date: May 15, 2019

Abstract

Introduction: Ureteral obstruction following vaginal mesh placement is a rare complication.

Hypothesis: We propose a mechanism of traction of the bladder neck as a cause for ureteral kinking and obstruction.

Methods: In this report we describe two surgical cases using vaginal mesh implant which presented with ureteral obstruction two days following the procedure.

Results: The patients were treated using temporary ureteral stents without removal of the implant.

Conclusion: Controlled tension of the implant during the procedure and routine diagnostic cystoscopy can prevent the complication.

Brief summary: Ureteral obstruction following vaginal implant treated with ureteral stents. A mechanism of traction of the bladder neck as a cause for ureteral obstruction is proposed.

Keywords: Vaginal implant, Ureteral obstruction, Pelvic organ prolapse

Introduction

Pelvic organ prolapse is a common phenomenon among women and its prevalence increases with age. Vaginal mesh is one of the surgical options for prolapse repair. According to the literature, vaginal mesh technique has better anatomical results compared to native tissue repair, but it is associated with a higher complication rate. These mesh related complications include mainly pain and erosion but also bladder perforation and voiding difficulties [1].

In pelvic reconstructive surgery ureteral obstruction is described in 5.1% of cases [2]. Ureteral obstruction following vaginal mesh placement is a rare complication (0.2%) in comparison to others i.e. bladder injury, bleeding or mesh erosion [3]. Ureteral injuries were described during

placement of four-armed anterior implant involving the posterior arms with partial or complete transection of the ureter causing urine leakage [3]. The perioperative complication rate has decreased in recent years with the emergence of new vaginal mesh techniques [4].

Doucède et al. described the sole case report of ureteral injury using the UpHold™ (Boston Scientific Corp. U.S.) vaginal mesh. In his report he describes the injury mechanism to be related to the Polypropylene mesh arms [5].

In this report we describe two surgical cases using the UpHold™ mesh implant (Boston Scientific Corp. U.S.) and the resulting ureteral obstruction. We propose a possible different mechanism that caused the obstruction.

Case Presentation

Case 1

The first case concerns a 62-year-old woman who presented to the outpatient Female Pelvic Medicine clinic for evaluation of pelvic organ prolapse. The patient complained of bulging sensation from her vagina which worsened in the last six months. She denied urinary incontinence. Past obstetric history was consistent with five vaginal deliveries. Her medical history was consistent with an episode of TIA 5 years prior, treated with daily dose of Aspirin 75 mg. On vaginal exam her POP-Q measurements were: Aa = -1 cm, Ba = 0 cm, C = +3 cm, Gh = 3 cm, Pb = 3 cm, TVL = 7 cm with no evidence of posterior wall defect. She was diagnosed with third degree apical prolapse, second degree cystocele and was informed of the treatment options with a detailed explanation of the risks involved in vaginal mesh surgery. The patient elected to have surgical treatment using vaginal mesh with uterine preservation and was scheduled for surgical correction using UpHold™ mesh.

A surgical repair under regional anaesthesia using UpHold™ mesh was conducted with no complications. The arms of the mesh were anchored to the Sacrospinous ligaments bilaterally using the Capiro™ device and the cervix, fixed to the center of the mesh, was positioned deep in the pelvis using the pulley manoeuvre on both mesh arms. On her first postoperative day the vaginal packing and Folly catheter were removed, and the patient recovered as expected. Her lab results revealed a normal creatinine level of 0.7 mg/dL and WBC at 16,000/ μ L with no abnormal shift. She reported no pain or other symptoms. Post-void residual volume was 65 cc. The patient was discharged home with routine post-operative instructions.

On second postoperative day the patient returned to the gynaecological ER with complaints of abdominal pain which did not respond to NSAIDs. On examination, she was afebrile and abdominal exam revealed diffused tenderness with no rebound, mild flank tenderness Left>Right, normal peristalsis and no swelling. On vaginal exam the surgical field was intact with no bleeding or signs of mesh erosion. Bimanual exam revealed no signs of hematoma or tenderness. Gynaecological ultrasound (US) was normal with no signs of hematoma or free fluid in the peritoneal cavity. Lab test showed an elevation in creatinine levels to 1.8 mg/dL with leucocytosis of 25,000/ μ L. Renal US revealed moderate bilateral hydronephrosis.

The patient was taken to the operating theatre for a

Cur Op Gyn Obs, 2(1): 233-237 (2019)

cystoscopy and ureterography. On cystoscopy the trigon region was mildly elevated with diffuse edema and swelling due to sub mucosal hematoma. The ureteral orifices were mildly pressed laterally. On retrograde ureterography, both distal ureters were displaced laterally with hydro-ureteronephrosis above (Figure 1). Bilateral double-J stents inserted with no technical difficulties. Post-operatively her abdominal pain subsided, leukocyte count normalized, creatinine levels dropped to normal values (0.6 mg/dL), and the patient was discharged home. After three months the patient was admitted for stent removal and ureterography under general anaesthesia. Cystoscopy revealed a normal looking bladder, including the trigone region. Bilateral retrograde ureterography showed a normal filling of the right ureter. On the left ureter, a distal segment of 3 cm, was partially narrowed. However, a normal contrast material passed through this segment and no hydronephrosis was demonstrated.

Two months after stent removal the patient reported no pain or discomfort, her blood creatinine level was stable at 0.7 mg/dL and on ultrasound scan the right kidney was normal. The left kidney displayed mild hydronephrosis, which stayed stable on follow up. Two months after stent removal, Renal Scintigraphy (DTPA), demonstrated normal bilateral kidney function, with no evidence of obstruction. Post-void residual volume was 19 cc. At the last follow up, six months following the surgery, the patient had optimal anatomical Pelvic Organ Prolapse quantification (POP-Q) measurements and denied symptoms of vaginal bulge.

Figure 1: Retrograde ureterography performed for evaluation of ureteral obstruction. Contrast material injected at the ureteral opening demonstrating the distal left ureteral partial obstruction due to kinking (arrow), with moderate hydronephrosis above it.

Case 2

The second patient was a 39-year-old healthy woman who presented with complaints of a mass bulging through her vagina causing daily disturbance and sexual disfunction. Past obstetric history was consistent with eight vaginal deliveries. Past medical and surgical history was non-contributory. On vaginal exam the POP-Q measurements were: Aa = +3 cm, Ba = +6 cm, C = +5 cm, Gh = 5 cm, Pb = 3 cm, TVL = 8 cm, Ap = 0 cm, Bp = -1 cm, D = -1 cm. An elongated cervix was noted as a component of the uterine prolapse. She was diagnosed with third degree utero vaginal prolapse. Patient received explanations of the treatment options addressing both her request for uterine preservation and the need to include cervical shortening to achieve anatomical success. A detailed explanation of the surgical procedure and the risks involving the use of vaginal mesh was given. The patient elected surgical treatment using vaginal mesh with partial trachelectomy and posterior colporrhaphy and signed a detailed informed consent. The mesh placement was uneventful, and the procedure included partial resection of the cervix as planned. On the first postoperative day vaginal packing and urinary catheter were removed and the recovery was as expected. Her lab results revealed a creatinine level of 0.6 mg/dL with normal leukocyte count and post-void residual volume of 87 cc. The patient was discharged home. Two days later, the patient presented to the gynaecological ER with left lower quadrant abdominal pain and left flank tenderness. On admission she was afebrile with normal vital signs. On physical exam her abdomen was soft with lower left quadrant tenderness, left flank tenderness and no abdominal rebound. On vaginal exam the surgical fields was intact with no signs of bleeding or mesh erosion. Bimanual exam revealed no hematoma. Her lab results showed a creatinine level of 0.7 mg/dL with no leucocytosis, and CRP was 81 mg/L. Renal US demonstrated severe left uretero-hydronephrosis. The patient was admitted and was given antibiotic treatment with ceftriaxone. An abdominal-pelvic CT with I.V contrast and secretory phases revealed mild right hydronephrosis and left moderate hydroureteronephrosis with obstruction of enhanced contrast material at the level of the distal ureter. The patient was taken to the OR and under general anaesthesia cystoscopy and bilateral retrograde ureterography were performed. This demonstrated a left ureteral obstruction. A stent was inserted into the left ureter uneventfully. During her post-operative admission, the pain subsided, and the creatinine level stayed stable at 0.7 mg/dL. The patient was discharged home.

The stent was removed 6 months later. Follow up US, one month after stent removal, demonstrated mild left hydronephrosis and the patient was asymptomatic. A repeat US, four months later, showed these findings to be stable. At last follow up, the patient had optimal anatomical and subjective success of her prolapse repair.

Discussion

In our institution we perform 180 urogynecologic procedures yearly. The surgeon who performed the surgical cases described above performed approximately 150 surgical cases using the UpHold™ mesh during the last three years. We describe two surgical cases in which an UpHold™ implant was used for the treatment of third degree symptomatic pelvic organ prolapse of the anterior and apical compartments. In both cases the procedure was performed uneventfully, and the patients developed symptoms of ureteral obstruction 48 hours following discharge from the hospital. In both cases a retrograde ureterography revealed a kink of the ureters as the cause of obstruction. Straightening the ureter using a ureteral stent relieved the symptoms and allowed recovery without removal of the implant. In both cases renal scan was found normal after stent removal reflecting complete recovery of renal function. Since the obstruction was iatrogenic and the duration of renal damage was short, we assumed that renal scan was sufficient for evaluation of glomerular recovery and function months after the event. Both cases were managed by a urogynecologist and a urologist.

The UpHold™ implant is made of a central 4X4 cm polypropylene mesh with two lateral arms intended to suspend the cervix to the sacrospinous ligaments bilaterally. The central mesh is anchored on its proximal part to the inner aspect of the cervix and on its distal part to the pubo-cervical fascia under the bladder neck. During the placement of the mesh, the surgeon places the lateral arms through the sacrospinous ligaments and fixes the central mesh to the fascia under the bladder neck. Following fixation of the central mesh with sutures, the lateral arms are pulled in order to position the cervix deep in the pelvis. The act of pulling the mesh deep into the pelvis pulls the bladder neck backwards as well. This maneuver might cause a kink of the ureters at its insertion into the bladder wall resulting in partial or complete obstruction. We believe that pulling the bladder neck backwards during the positioning of the mesh is the reason for the ureteral obstruction presented in these cases. The possibility of ureter injury secondary to suture placement is less likely since the securement

mesh sutures are placed on the pubo-cervical fascia and not the bladder neck directly. The mechanism of action is demonstrated in figure 2.

The ureter obstruction can be avoided by reducing the pullback maneuver that retracts the bladder neck backwards, thereby reducing the distortion of the ureters at the entry to the bladder wall. Intraoperative cystoscopy is recommended after reconstructive pelvic surgery using native tissue techniques [2,6]. In our institution we do not perform cystoscopy following each pelvic floor surgery. Following the occurrences of these two surgical complications we started to perform diagnostic cystoscopy following each mesh placement in order to detect possible ureteral obstruction. Dass et al. reported delayed ureteral injury after 4 corner mesh replacement which ended with uretero-vaginal fistula. It appears that the mechanism of action in his report is different than the current report, although the injury involved the lower arm of the mesh which can represent the UpHold™ arm [7].

Another report of bilateral ureteral kink is described by de Tayrac et al. that resolved after mesh removal and stent placement. The mesh was fixed in four corners and the mechanism of kinking was not explained [8]. Neuman et al. in his cadaveric study of relationship between the mesh posterior arms and the ureter found a distance that can be as low as 5 mm but explains that during the surgical technique the surgeon's finger protects the ureter and creates a safe introduction of the mesh arm to the sacrospinous ligament. We believe that injury to the ureter during bladder dissection would present as hematuria, suggesting that the ureteral kink is not secondary to dissection injury but anatomical distortion [9]. Kasyanet al. described ureteral injury which was diagnosed after surgery but revealed urine leakage extending to the inter-fascial space of the right hip suggesting intra operative direct injury to the ureter secondary to dissection and not kinking [10]. Cayrac et al. in his cadaver study confirmed that the ureter can be twisted because of the mesh traction [11].

Doucède et al. describe ureteral injury after placement of Uphold™ mesh [5]. In his case the patient presented one month following the procedure and the initial treatment of partial mesh removal and ureteral stent placement was insufficient since the long-term follow-up revealed recurrence of the ureteral obstruction. The author describes the area of obstruction during the surgical exploration as "small area of devascularization". We

believe that the kink mechanism in this case is similar to our report. In our case the appearance of the symptoms 2 days post-surgery allowed us to intervene early and avoid the devascularization effect which impacted the ureter in a later stage. We were unable to find suggested strategies for treatment of such complication in the literature.

Figure 2: Illustration of ureteral kink mechanism.

The anterior part of the mesh implant is pulled back during vaginal apex re-location (blue arrow) causing retraction of the bladder neck causing kink of the ureter at the level of the ureter-vesical junction (enlarged at the right upper corner).

P = Pubic bone, B = Bladder, V = Vagina, M = Mesh implant, Ut = Uterus, R = Rectum, Ur = Ureter. Blue arrow = direction of bladder trigon traction. (Graphic by Uri Raban)

Conclusion

Ureteral injury is a rare complication of vaginal mesh surgery both in four and two point's fixation techniques. In this report we describe two cases of ureteral kinking after UpHold™ mesh repair presented 48 hours after an uneventful operation. We believe that the mechanism of action is traction of the bladder neck backwards by the mesh causing a kink of the ureter at the entrance to the bladder. This complication can be avoided by reducing the mesh traction and can be diagnosed using routine cystoscopy for ureteral patency at the end of all vaginal procedures involving mesh implants.

Contribution

Gil Levy: Collected the data, reviewed the literature and wrote the manuscript. Anat Beck: Collected the data, reviewed the literature and wrote the manuscript. Orit Raz: Collected the data and wrote the manuscript. Moty Pansky: Reviewed the literature and wrote the manuscript.

Ethical approval

IRB approval not required for anonymous case review.

Conflict of interest

Gil Levy: Instructor for BSC cadaver workshop on UpHold device; Anat Beck: None; Orit Raz: None; Moty Pansky: None.

References

1. Jeffery ST, Kortz BS, Muavha D, et al. Morbidity of a single incision trans vaginal mesh to correct apical prolapse. *J Minim Invasive Gynecol.* 2018;18:31411-0. Doi: <https://doi.org/10.1016/j.jmig.2018.12.007>
2. Gustilo-Ashby AM, Jelovsek JE, Barber MD, et al. The incidence of ureteral obstruction and the value of intraoperative cystoscopy during vaginal surgery for pelvic organ prolapse. *Am J Obstet Gynecol.* 2006;194(5):1478-1485. Doi: <https://doi.org/10.1016/j.ajog.2006.01.064>
3. Kasyan G, Abramyan K, Popov AA, et al. Mesh-related and intraoperative complications of pelvic organ prolapse repair. *Cent European J Urol.* 2014;67(3):206-301. Doi: <https://doi.org/10.5173/cej.2014.03.art17>
4. Rahkola-Soisalo P, Mikkola TS, Altman D, et al. Pelvic organ prolapse repair using the uphold vaginal support system: 5-year follow-up. *Female Pelvic Med Reconstr Surg.* 2017;25(3):200-205. Doi: <https://doi.org/10.1097/SPV.0000000000000530>
5. Doucède G, Giraudet G, Lucot JP, et al. Ureteral kinking during cystocele correction through UpHold subvesical mesh: Case report. *Eur J Obstet Gynecol Reprod Biol.* 2016;203:334-335. Doi: <https://doi.org/10.1016/j.ejogrb.2016.04.019>
6. Harris RL, Cundiff GW, Theofrastous JP, et al. The value of intraoperative cystoscopy in urogynecologic and reconstructive pelvic surgery. *Am J Obstet Gynecol.* 1997;177(6):1367-1371. Doi: [https://doi.org/10.1016/S0002-9378\(97\)70077-2](https://doi.org/10.1016/S0002-9378(97)70077-2)
7. Dass AK, Lo T-S, Khanuengkitkong S, et al. A delayed type of ureteric injury developed after transobturator mesh procedure for massive prolapse. *Female Pelvic Med Reconstr Surg.* 2013;19(3):179-180. Doi: <https://doi.org/10.1097/SPV.0b013e31827de9f8>
8. De Tayrac R, Boileau L, Fara J-F, et al. Bilateral anterior sacrospinous ligament suspension associated with a paravaginal repair with mesh: short-term clinical results of a pilot study. *Int Urogynecol J.* 2010;21(3):293-298. Doi: <https://doi.org/10.1007/s00192-009-1036-1>
9. Neuman M, Masata J, Hubka P, et al. Sacrospinous ligaments anterior apical anchoring for needle-guided mesh is a safe option: A cadaveric Study. *Urology.* 2012;79(5):1020-1022. Doi: <https://doi.org/10.1016/j.urology.2012.01.045>
10. Kasyan G, Abramyan K, Popov AA, et al. Mesh-related and intraoperative complications of pelvic organ prolapse repair. *Cent European J Urol.* 2014;67(3):296-301. Doi: <https://doi.org/10.5173/cej.2014.03.art17>
11. Cayrac M, Letouzey V, Ouzaid I, et al. Anterior sacrospinous ligament fixation associated with paravaginal repair using the Pinnacle™ device: An anatomical study. *Int Urogynecol J.* 2012;23(3):335-340. Doi: <https://doi.org/10.1007/s00192-011-1554-5>

Copyright: © Levy et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.