CASE REPORT

Tips for operation of inguinal hernia after implantation of artificial urinary sphincter following radical prostatectomy: report of two cases

Ryusuke Saito¹, Naoki Tanaka¹,*, Takashi Aizawa¹, Hirofumi Imoto¹, Akihiro Yamamura¹, Takeshi Aoki¹, Naoki Kawamorita², Hiroaki Musha¹, Shinobu Ohnuma¹, Fuyuhiko Motoi¹, Akihiro Ito², Takashi Kamei¹, Takeshi Naitoh¹, and Michiaki Unno¹

¹Department of Surgery, Tohoku University Graduate School of Medicine, Sendai, Miyagi, Japan and
²Department of Urology, Tohoku University Graduate School of Medicine, Sendai, Miyagi, Japan

*Correspondence address. Department of Surgery, Tohoku University Graduate School of Medicine, 1-1 Seiryomachi, Aobaku, Sendai, Miyagi 980-8574, Japan. Tel: +81227177205; Fax: +81227177209; E-mail: n-tanaka@surg.med.tohoku.ac.jp

Abstract

Urinary incontinence is one of the common complications after radical prostatectomy along with inguinal hernia. Artificial urethral sphincter implantation is widely accepted as a treatment option. We report two surgical cases of inguinal hernia after artificial urethral sphincter implantation for urinary incontinence following radical prostatectomy. In Case 1, since the device went through the inguinal canal, adhesion around the pubis was extremely hard. In Case 2, the device was placed on the ventral side of the rectus abdominis muscle, so it was operable almost as normal. In each case, the surgical procedure was considered carefully after confirming the location of the device by preoperative computed tomography and ultrasonography. Hernia repair was successfully performed using the Lichtenstein method. There are few reports regarding surgical repair of inguinal hernia following artificial urinary sphincter implantation. Preoperative image and appropriate choice of approach could facilitate safe and secure surgery.

INTRODUCTION

Radical prostatectomy (RP) for clinically localized prostate cancer is a widely accepted treatment [1]. There are some distressful complications after RP, which influence the quality of patients’ life such as urinary incontinence, impotence and inguinal hernia (IH). The incidence of IH after open RP and laparoscopic RP is reported to 24 and 14%, respectively, which is extremely higher than that in natural populations [2, 3]. There are some options for hernioplasty after RP and lower abdominal surgery, including transabdominal preperitoneal approach, totally extraperitoneal approach and anterior approach [4, 5].

For the treatment of urinary incontinence, an artificial urinary sphincter (AUS) was introduced in 1972 and it is still the gold standard for the management of incontinence with excellent outcomes [6]. The AUS consists of three parts including an inflatable cuff, a pressure regulating balloon and the control pump [6]. With squeezing of the pump in the scrotum, fluid flows from cuff located around the urethra to the pump and then the cuff is kept in the open position (Fig. 1).
Here, we report two cases of IH after AUS implantation following RP. We present two cases of indirect hernia and tips for operation in this report.

CASE REPORT

Case 1

A 79-year-old male was referred to our institute for the treatment of right IH. He had received AUS implantation for the treatment of incontinence after RP for prostate cancer. Abdominal computed tomography (CT) showed right IH and a balloon that was placed by the bladder and a connecting catheter that went through the lateral side of the rectus abdominis muscle (Fig. 2). In the operation, we performed ultrasonography (US) at first and it demonstrated that the catheter was running through the inguinal canal (Fig. 3). When we incised the aponeurosis of the external abdominal oblique muscle, the catheter of the AUS was observed in the inguinal canal (Fig. 4). We identified the hernia sac protruding from the inguinal ring and diagnosed it as an indirect IH. The adhesion was too hard to separate the catheter from the pubis and posterior wall of the inguinal canal around pubis. Then, the IH was repaired using the Lichtenstein technique; however, the mesh near the pubis could not be spread as ordinarily.

Case 2

A 75-year-old male was referred for the treatment of a right IH. He also had received AUS implantation for a similar medical course. Abdominal CT demonstrated that a balloon was located beside the bladder and that the connecting catheter went...
Inguinal hernia after implantation of artificial urinary sphincter following radical prostatectomy

通过腹直肌和右阴囊通过皮下层（图5）。导管可被扪诊于皮下，因此，皮肤切口置于外侧而非正常情况。诊断为间接疝，我们未观察到AUS在阴囊中的任何成分，并使用Lichtenstein方法进行了修复。

DISCUSSION

IH是RP后最常见的并发症之一，应该进行手术修复以缓解症状并防止嵌顿。另一方面，尿失禁也是RP后的主要并发症，AUS的植入是标准治疗[6]。当IH发生在AUS植入后，我们应该特别注意对疝修补的管理，以避免损坏装置。本报告中，我们遇到了两例IH后AUS植入的病例。

虽然成人男性的自发发生率估计为5% [7]，但IH在开放RP患者中发生率为24%，而经腹腔镜RP患者中发生率为14% [2, 3]。大多数IH后RP是间接的，报告的发病率可达91–100% [7, 8]。原因不确定，但可能存在腹壁损伤与手术有关，可能会导致一个开放的腹膜鞘，发展为间接IH [9]。实际上，术后腹膜后壁的粘连可能防止直接IH。我们经验的两个病例都是间接类型的。一般而言，排尿时腹部压力的增加是IH的主要因素之一 [10]。尽管患者的尿失禁程度在AUS植入前因严重尿失禁而降低，但AUS植入后显著增加。这可能是我们病例IH发展的重要因素。

有报道表明，腹腔镜修补术可能因腹腔镜在腹膜腔内有瘢痕和粘连而禁止 [4]。此外，通过腹膜前间隙损伤AUS装置是难以避免的。因此，我们选择最为熟悉的方法——前路法。第一例患者的手术较为困难，因为腹膜后粘连，但第二例则不是。两例病例的不同之处在于导管是否穿过阴囊。我们可通过术前CT和US检测到导管的轨迹，这可能是一个很好的预测因素。

结论，虽然IH后AUS植入是罕见的，但随着AUS植入的增加，这种情况将会增加，因为IH后RP的高发生率。术前管理包括CT，了解AUS装置的正确选择和手术过程对于安全和安全的手术至关重要。
ACKNOWLEDGMENTS
We would like to thank the Tohoku University Center of General Surgery and Urology for the use of its facilities.

CONFLICT OF INTEREST STATEMENT
The authors declare no conflict of interest.

FUNDING
This research did not receive any specific grant from funding agencies in the public, commercial or not-for-profit sectors.

REFERENCES
1. Bill-Axelson A, Holmberg L, Ruutu M, Häggman M, Andersson S-O, Bratell S, et al. Radical prostatectomy versus watchful waiting in early prostate cancer. N Engl J Med 2005;352:1977–84.
2. Stranne J, Hugosson J, Iversen P, Morris T, Lodding P. Inguinal hernia in stage M0 prostate cancer: a comparison of incidence in men treated with and without radical retropubic prostatectomy: an analysis of 1105 patients. Urology 2005;65:847–51.
3. Yoshimine S, Miyajima A, Nakagawa K, Ide H, Kikuchi E, Oya M. Extraperitoneal approach induces postoperative inguinal hernia compared with transperitoneal approach after laparoscopic radical prostatectomy. Jpn J Clin Oncol 2009;40:349–52.
4. Winslow ER, Quasebarth M, Brunt LM. Perioperative outcomes and complications of open vs laparoscopic extraperitoneal inguinal hernia repair in a mature surgical practice. Surg Endosc 2004;18:221–7.
5. Wakasugi M, Suzuki Y, Tei M, Anno K, Mikami T, Tsukada R, et al. The feasibility and safety of single-incision totally extraperitoneal inguinal hernia repair after previous lower abdominal surgery: 350 procedures at a single center. Surg Today 2017;47:307–12.
6. James MH, McCammon KA. Artificial urinary sphincter for post-prostatectomy incontinence: a review. Int J Urol 2014;21:536–43.
7. Regan TC, Mordkin RM, Constantinople NL, Spence IJ, Dejter SW Jr. Incidence of inguinal hernias following radical retropubic prostatectomy. Urology 1996;47:536–7.
8. Sakai Y, Okuno T, Kijima T, Iwai A, Matsuoka Y, Kawakami S, et al. Simple prophylactic procedure of inguinal hernia after radical retropubic prostatectomy: isolation of the spermatic cord. Int J Urol 2009;16:848–51.
9. Fukuta F, Hisasue S, Yanase M, Kobayashi K, Miyamoto S, Kato S, et al. Preoperative computed tomography finding predicts for postoperative inguinal hernia: new perspective for radical prostatectomy-related inguinal hernia. Urology 2006;68:267–71.
10. Kaiho Y, Mitsuzuka K, Yamada S, Saito H, Adachi H, Yamashita S, et al. Urinary straining contributes to inguinal hernia after radical retropubic prostatectomy. Int J Urol 2016;23:478–83.