CASE REPORT

Persistent urinary incontinence after a robot-assisted artificial urinary sphincter procedure: lessons learnt from two cases

François Hervé, Nicolaas Lumen, An-Sofie Goessaert, Karel Everaert

Department of Urology,
Universitair Ziekenhuis Gent,
Gent, Belgium

Correspondence to
Professor Karel Everaert,
karel.everaert@uzgent.be

Accepted 9 October 2016

SUMMARY

This case report describes 2 cases of persistent urinary incontinence in the beginning of the learning curve of robot-assisted bladder neck implantation of an artificial urinary sphincter (RA-AUS) in men at risk for erosion due to neurological lesions. Among a series of 4 RA-AUS, 2 patients still experienced urinary incontinence after surgery. A complete urological workup was strictly normal and did not show any device malfunction. However, during an AUS revision in these two patients, exploration revealed that the cuff was not tight enough. This issue was resolved by placing smaller cuffs. After redo surgery, one of the two patients no longer had urinary incontinence, while the second patient was lost to follow-up. Insufficient tightness of the cuff could be explained by an inability of the surgeon to feel the force while pulling the cuff around the urethra due to the absence of haptic sensation in robotic surgery.

BACKGROUND

Artificial urinary sphincter (AUS) is the gold standard treatment for severe urinary incontinence with proven sphincter insufficiency. In most patients, the AUS is placed through a perineal approach around the bulbar urethra because they usually present with a relatively normal urethra.

Neurogenic urinary incontinence in males due to spinal cord or peripheral nerve injury is another rare but important indication for AUS. In these neurological cases, AUS is placed around the bladder neck through an abdominal incision, in order to reduce the risk of erosion.¹

Over the past 10 years minimally invasive surgery and the use of robotic systems have become much more prominent. It has many advantages for the patient (lower risk of eventration, better cosmetic results) as well as for the surgeon.

The aim of this case report is to point out and discuss one of the pitfalls faced after bladder neck robot-assisted implantation of an artificial urinary sphincter (RA-AUS).

This might be of interest for colleagues using robotic systems to implant AUS, as well as for those using it for other types of surgery.

CASE PRESENTATION

Two cases are described of men (48 and 62 years old) with neurogenic stress urinary incontinence (sphincter deficiency without detrusor overactivity) who underwent RA-AUS.

The first patient suffered a complete D9-D10 spinal cord injury (neurological classification of American Spinal Injury Association ASIA A) as a result of a fall from a truck 7 years ago. Initially, the patient had an indwelling catheter because of bladder retention; after learning self-catheterisation he reported urinary incontinence in between catheterisation procedures.

Urodynamics confirmed adequate bladder compliance, a lack of bladder contraction and intrinsic sphincter deficiency.

The patient underwent placement of a retrourethral male sling with good results: he no longer experienced urinary incontinence in between the self-catheterisations. Unfortunately, after 7 years without any problem, he experienced stress incontinence again. New urodynamic investigations showed hypocontractile detrusor and sphincter deficiency.

The second patient was a 62 years old man with a 2-year history of D4-D10 paraplegia due to Lyme disease. Urological anamnesis revealed urinary retention and stress incontinence during mobilisation (from bed to wheelchair, for example). Urodynamic investigations showed hypocontractile detrusor and sphincter deficiency.

Both patients qualified for placement of an AUS and chose robot-assisted laparoscopic placement. Bearing in mind that both patients had to perform self-catheterisation to empty their bladder completely, both AUS were placed around the bladder neck, in order to reduce the risk of erosion.

A transperitoneal five-port approach was used using a three-arm standard da Vinci Si robot (Intuitive Surgical, Sunnyvale, California, USA). The patient was placed in a standard gynaecological position in a 30° Trendelenburg position. The AUS cuff was placed circumferentially around the bladder neck. The reservoir was left intra-abdominally in a lateral vesicular space, and the pump was placed in a classic scrotal position.

Both procedures were successfully performed without the need for conversion to an open procedure. The operative time was 165 and 230 min. There were no bladder or urethral injuries during the surgery.

The length of hospital stay was 5 and 3 days. The median estimated blood loss was 5 and 50 mL. The early postoperative period (6 weeks postoperative) was uneventful for both patients. The two patients came for consultation 6 weeks after the surgery, as in our standard practice, in order to remove the urethral catheter and activate the device.

CrossMark

To cite: Hervé F, Lumen N, Goessaert A-S, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2016-216971

Both patients described invalidating residual leakage persisting after device activation.

While experiencing no urinary incontinence during the day, the first patient reported nocturnal urinary incontinence at the 6-month postoperative consultation. This incontinence was already present after the AUS activation. Nevertheless, the patient did not instantly consult because quality of life related to daytime symptoms had improved.

The second patient reported persistent urinary leakage on three consultations, respectively, 1, 2 and 3 weeks after device activation.

DIFFERENTIAL DIAGNOSIS

Erosion, urinary infection or a problem with the prosthetic material (leakage in the pressure-regulating balloon, in the cuff or defect of the pump) could have been the possible aetiologies to explain the situation.

A complete urological workup including bacteriological urine analysis, cystoscopy and radiographical evaluation of the prosthetic material was normal, free from erosion, urinary infection and device malfunction.

TREATMENT

Both patients underwent an AUS revision (robot-assisted) (10 months and 10 weeks after the initial surgery, respectively) and exploration revealed that the cuff was not tight enough. A smaller cuff was placed: 7 cm instead of 9 cm for the first patient and 5 cm instead of 7 cm for the other.

OUTCOME AND FOLLOW-UP

After activation of the device, 6 weeks after the re-do procedure, the first patient was perfectly dry and remained so (1 year follow-up). Unfortunately, the second patient still experienced leakage up to 9 weeks after the re-do procedure and was lost to follow-up.

DISCUSSION

An initial experience with RA-AUS around the bladder neck in men in whom a perineal approach is not suitable due to neurogenic stress incontinence is presented in this case report. Two patients with persistent urinary incontinence immediately after RA-AUS among a series of four are discussed.

AUS was introduced for the first time in 1972 by Foley and since then revolutionised surgical management of stress urinary incontinence and intrinsic sphincter deficiency. The prosthetic device that we now use is composed of three main parts: an inflatable cuff, a pressure-regulating balloon and a control pump; it improves quality of life of patients with postprostatectomy incontinence, sphincter weakness incontinence or intrinsic sphincter deficiency.

For male patients, the cuff is traditionally placed around the bulbar urethra during an open perineal procedure. The reservoir is placed under the abdominal muscles, and the control pump is implanted in a dartos pouch in the scrotum.¹

In men with neurogenic stress incontinence, the AUS is inserted around the bladder neck (prostatic urethra), as these patients have a higher risk of prosthetic erosion due to repetitive self-catheterisation, constant pressure on bulbar urethra due to being in a wheelchair, need of endoscopic treatments. This is also a way to avoid infections in neurogenic patients with an open bladder neck and urethral urine stasis when the cuff is placed in a bulbar position.²

Some authors described conventional laparoscopic implantation of bladder neck AUS in small series.^{3–6} They demonstrated

the feasibility of such a technique and its technically demanding feature compared with an open approach. Besides its minimally invasive aspect, one of the main advantages of laparoscopy in this case is the better imaging and the direct view of the anatomy, especially in the bladder-neck area where the Retzius' space and the correct plan between the posterior side of the bladder neck and the anterior wall of the vagina can be difficult to deal with.³

The use of robotic surgery has increased over the last few decades and took an important place in the field of laparoscopic surgery. It brought technological advantages, improving the surgeon's comfort. Three-dimensional magnified vision, tremor filtration, improved ergonomics, high dexterity thanks to instruments articulations and transformation of large gestures of the surgeon into microsurgical movements are all factors which have enhanced degrees of freedom of the surgeon. This is even more valid in tight spaces and in obese patients.

Some studies have pointed out feasibility and safety⁷ of such a technique with better clinical outcomes in terms of blood loss, hospital stay, postoperative pain and recovery period when compared to laparotomy.⁸ Nevertheless, scientific superiority still has to be demonstrated in comparison with laparoscopy.

To date, common urological procedures such as prostatectomy, partial and total nephrectomy, cystectomy or pyeloplasty are performed with robot assistance. However, robotic surgery is still in its infancy for functional neurourology. Three series recently reported the use of robot-assisted laparoscopic route for implantation of AUS in women.^{2 9 10}

Peyronnet *et al*¹⁰ retrospectively compared open RA-AUS procedures in 24 female patients and found in the robot-assisted group a lower postoperative complication rate (75 vs 25%; $p=0.02$; statistical power=66.8%) and a shorter hospital stay (9.3 vs 3.5 days, $p=0.02$).

The major limitation of these studies is the limited sample size. Despite the many advantages of robot-assisted surgery, benefits for this specific procedure are difficult to confirm from our early experience. The main disadvantage of robotic surgery is the absence of haptic sensation. Insufficient tightness of the cuff could be explained by an inability of the surgeon to feel the force while pulling the cuff around the urethra.

Another explanation could be the fear of the surgeon to come too close to the bladder and cause a perforation. In order to avoid it, too much tissue would have been left between the cuff and the bladder neck, explaining that the cuff is too loose.

The problem was easily solved by placing a smaller cuff in one patient (7 cm instead of 9 cm), but it did contain a new surgical procedure. The second patient was still wet after the second surgery and then was lost to follow-up. Two other patients (not described in our case report) who had RA-AUS without any problem after activation of the device had cuff sizes of 7.5 and 6 cm.

Although RA-AUS has already been described in small cohort,^{2 9} to the best of our knowledge, there are no data in the literature about such a complication with this kind of surgery.

Eswara *et al*¹¹ described revision techniques after AUS failure in men. However, these techniques were not robot-assisted procedures, the patients included underwent not only abdominal but overall perineal approach, and finally the failure was most of the time a recurrence of urinary incontinence, with no immediate failure as described in this case report.

Learning points

- ▶ Bladder neck robot-assisted implantation of an artificial urinary sphincter is feasible and safe.
- ▶ Initial high revision rate is attributed to the start of the learning curve.
- ▶ Lack of haptic sensation with robotic systems may also represent a pitfall explaining here the failure of initial procedure.
- ▶ The problem was solved by placing a smaller cuff.

Contributors FH and KE contributed to conception and design, acquisition of data or analysis and interpretation of data and drafting the article. NL contributed to acquisition of data. A-SG contributed to analysis and interpretation of data. All authors contributed to revising the article critically for important intellectual content and final approval of the version published. They agreed to be accountable for the article and to ensure that all questions regarding the accuracy or integrity of the article are investigated and resolved.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Hussain M, Greenwell TJ, Venn SN, Mundy AR. The current role of the artificial urinary sphincter for the treatment of urinary incontinence. *J Urol* 2005;174:418–24.
- 2 Yates DR, Phé V, Rouprêt M, *et al*. Robot-assisted laparoscopic artificial urinary sphincter insertion in men with neurogenic stress urinary incontinence. *BJU Int* 2013;111:1175–9.
- 3 Rouprêt M, Misraï V, Vaessen C, *et al*. Laparoscopic approach for artificial urinary sphincter implantation in women with intrinsic sphincter deficiency incontinence: a single-centre preliminary experience. *Eur Urol* 2010;57:499–505.
- 4 Trolliet S, Mandron E, Lang H, *et al*. Implantation de sphincter artificiel urinaire par voie laparoscopique chez des femmes avec incontinence urinaire d'effort sévère. *Prog Urol* 2013;23:877–83.
- 5 Ngninkeu BN, van Heugen G, di Gregorio M, *et al*. Laparoscopic artificial urinary sphincter in women for type III incontinence: preliminary results. *Eur Urol* 2005;47:793–7.
- 6 Hoda MR, Gauruder-Burmester A, Kümmel C, *et al*. Management of female stress urinary incontinence. Endoscopic extraperitoneal artificial urinary sphincter—early experience. *Urologe A* 2008;47:1004–8.
- 7 Cadière GB, Himpens J, Germay O, *et al*. Feasibility of robotic laparoscopic surgery: 146 cases. *World J Surg* 2001;25:1467–77.
- 8 Aarts JWM, Nieboer TE, Johnson N, *et al*. Surgical approach to hysterectomy for benign gynaecological disease. *Cochrane Database Syst Rev* 2015;(8):CD003677.
- 9 Biardeau X, Rizk J, Marcelli F, *et al*. Robot-assisted laparoscopic approach for artificial urinary sphincter implantation in 11 women with urinary stress incontinence: Surgical technique and initial experience. *Eur Urol* 2015;67:937–42.
- 10 Peyronnet B, Vincendeau S, Tondut L, *et al*. Artificial urinary sphincter implantation in women with stress urinary incontinence: preliminary comparison of robot-assisted and open approaches. *Int Urogynecol J* 2016;27:475–81.
- 11 Eswara JR, Chan R, Vetter JM, *et al*. Revision techniques after artificial urinary sphincter failure in men: results from a multicenter study. *Urology* 2015;86:176–80.

Copyright 2016 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow