—Report on Experiments and Clinical Cases—

Bone-anchored Sling Created with the InVance™ System for the Treatment of Incontinence after Radical Prostatectomy: Initial Experience in Japan

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Abstract

This report describes creation of a bone-anchored sling with the InVance™ system (American Medical Systems, Minnetonka, MN, USA) for the treatment of 2 patients with incontinence after radical prostatectomy. The InVance™ system uses a silicon-coated polyester sling positioned under the bulbar urethra via a perineal incision. The sling is attached to both ischiopubic rami by 3 titanium screws. Operative times were 157 minutes (patient 1) and 240 minutes (patient 2). Blood loss was 70 mL (patient 1) and 10 mL (patient 2). The patients used 7 and 5 absorbent pads/day, respectively, before surgery and 1 and 0 pads/day after surgery (this datum does not appear in the main text, although the absence of incontinence is mentioned). The only major adverse event encountered was mesh infection necessitating mesh removal in patient 2. This operation appears comparatively simple and useful.
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Key words: male sling, radical prostatectomy, urinary incontinence

Introduction

Radical prostatectomy is an effective curative treatment for localized prostate cancer but often results in urinary incontinence. Urinary incontinence usually resolves within 6 to 12 months but persists in 1% to 2% of patients[1]. Although training of the muscles of the pelvic floor and anticholinergic agents are reportedly effective for treating urinary incontinence, surgical management is recommended when symptoms persist. Surgical treatments have included creation of an artificial urinary sphincter and collagen injections, but a new method, creation of the male sling, has reportedly been effective in Europe and the United States[2–6]. Because the creation of a male sling is not covered by insurance programs in Japan, no reports from Japan describing this operation have been published. Therefore, the present report describes our use of a bone-anchored sling created with the InVance™ system (American Medical Systems, Minnetonka, MN, USA) to treat urinary incontinence after radical prostatectomy.

Materials and Methods

Approval for creation of a bone-anchored sling with the InVance™ system was obtained from the

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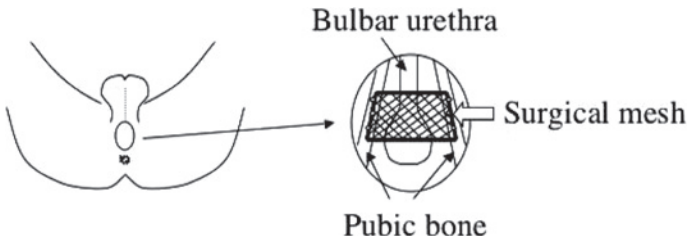

Fig. 1 A diagram of the anatomy of the bone-anchored sling.

ethics review board for Nippon Medical School. Patients reported severe urinary incontinence (more than 5 absorbent pads per day) due to intrinsic sphincter deficiency at least 2 years after radical prostatectomy. Bone-anchored slings were created for 2 patients after they gave informed consent for the operation. We imported the InVance™ system ourselves. The procedure was performed with the Straight-In bone-anchoring system (American Medical Systems), which includes a silicone-coated surgical mesh, a straight bone anchor inserter, and 6 bone anchor screws each attached to a pair of No. 1 polypropylene sutures. A Foley catheter was introduced into the bladder. A vertical midline perineal incision was made, and the skin and subcutaneous tissues were dissected free until the bulbospongiosus muscle was exposed **(Fig. 1, 2)**. The bulbospongiosus muscle was retracted, and medial-lateral dissection was performed until the medial aspect of the inferior ramus of the pubic bone was identified. Six bone screws, each attached to a pair of No. 1 polypropylene sutures, were inserted into the inner aspect of the inferior ramus of the pubic bone **(Fig. 3, 4)**. The first bone anchor was inserted just below the symphysis pubis, and the second and third anchors were inserted 2 cm laterally. This step was then repeated on the other side. The 6 pairs of polypropylene sutures were passed through holes at each of the 6 sling edges. Three pairs of sutures on 1 side of the sling were tightly tied to the bone. After the sling tension was adjusted, the 3 pairs of sutures on the other side were tied to press firmly on the bulbar urethra **(Fig. 1, 5)**. The wound was irrigated with saline and closed in layers. The Foley catheter was withdrawn on postoperative day 2, and the degree of urinary incontinence was confirmed.

Results

Patient 1

Patient 1 was a 67-year-old man who had undergone laparoscopic radical prostatectomy for T1c prostate cancer. The patient was selected to receive the bone-anchored sling because he had used 7 pads/day for urinary incontinence for the 2 years after surgery and because a urodynamic study showed stress incontinence. Operative time was 157 minutes, and blood loss was 70 mL. Urinary retention was seen on postoperative day 2, but this symptom resolved the next day. Postoperatively, nonsteroidal anti-inflammatory drugs (NSAIDs) were administered for perineal pain. No urinary incontinence was apparent after removal of the Foley catheter, and the patient has been using only 1 pad/day as of 2 years after surgery.

Patient 2

Patient 2 was a 73-year-old man who had undergone retropubic radical prostatectomy for T2c prostate cancer. The patient was selected to receive a bone-anchored sling because he had been using 5 pads/day for 2 years after surgery and because a urodynamic study showed stress incontinence. Operative time was 240 minutes, and blood loss was 10 mL. Postoperatively, NSAIDs were administered for perineal pain. No urinary incontinence was apparent after removal of the Foley catheter, but mesh infection developed 1 week postoperatively. We administered antibiotics for the mesh infection but removed the mesh 3 months after the sling operation because we did not accept improvement. Urinary incontinence returned to preoperative levels.

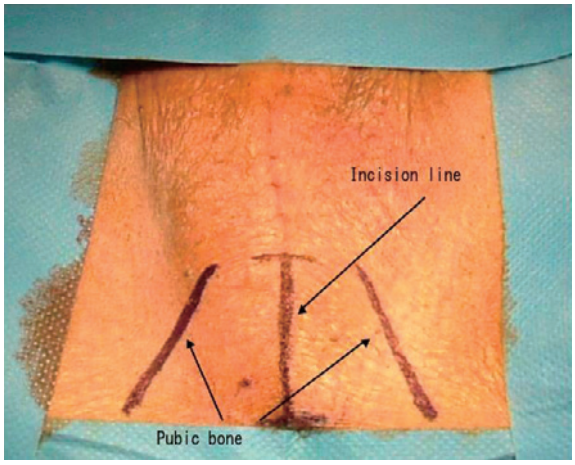

Fig. 2 A longitudinal incision about 4 cm in length is made in the perineal area between the pubic bones.

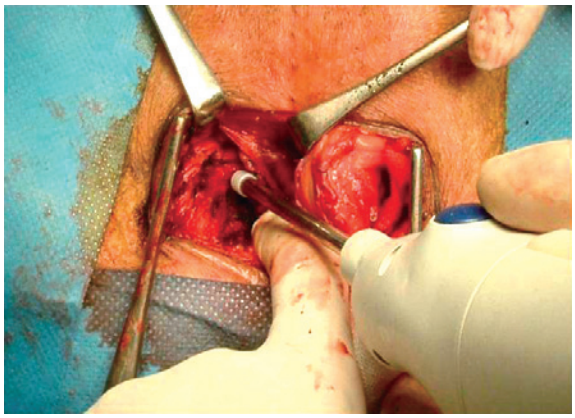

Fig. 3 By means of the bone anchor inserter, the first bone anchor is inserted just below the symphysis pubis at the medial aspect of the inferior ramus of the pubic bone.

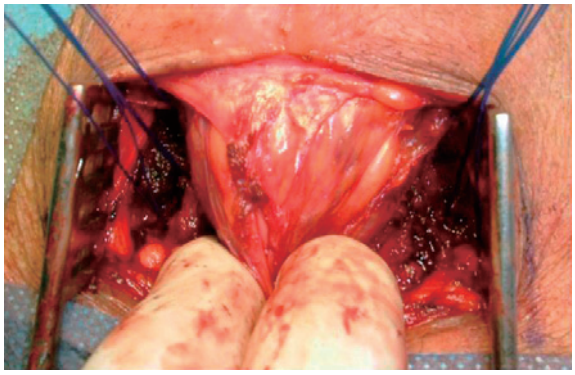

Fig. 4 Six bone screws, each attached to a pair of No. 1 polypropylene sutures, are inserted into the inner aspects of the inferior rami of the pubic bone.

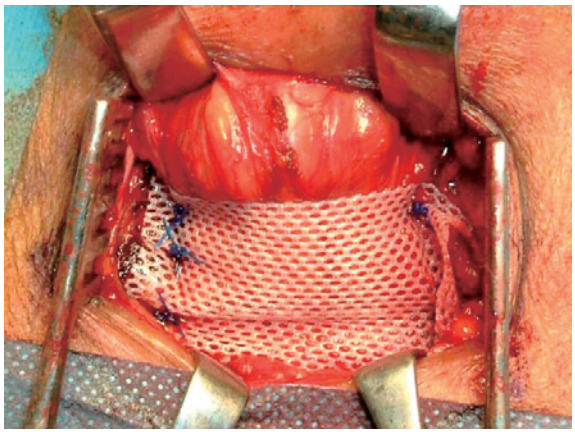

Fig. 5 Final position of the sling tied to the medial aspects of the inferior pubic rami.

Discussion

For the surgical management of urinary incontinence after radical prostatectomy, creation of an artificial urinary sphincter is considered the gold standard, and its efficacy for the treatment of severe urinary incontinence has been established[1]. This operation is not widely performed, although it has recently been used as highly advanced medical care in Japan. Reasons for the limited use of this procedure are its considerable expense and associated risk of complications, including mechanical problems[1].

The male sling was reported in 1970 by Kaufman et al.[7], and the bone-anchored male sling was reported in 1998 by Schaeffer et al.[8]. The male sling technique used with the InVance™ system was reported in 2001 by Madjar et al.[9] and is now widely used in Europe and the United States.

Creation of a bone-anchored sling does not require great manual skill and takes approximately 1 hour. However, creating the bone anchor, which is not used in normal urinary organ operations, can be difficult for surgeons without experience with this technique. For patient 2, we inserted screws without exposing the periosteum of the pubic bones to sufficient light, leading to the loss of a screw and a subsequent increase in operation time. However, this operation did not otherwise require great manual skill.

The male sling is considered useful for treating

mild-to-moderate urinary incontinence[1] and achieves a curative rate of 60% to 70% and an improvement rate 80% to 90%. Moreover, Carmel et al. have recently reported that creating a male sling is an effective treatment for severe urinary incontinence[10]. Postoperative urinary incontinence resolved in both our patients, a result that indicates the utility of the procedure.

A complication associated with the bone-anchored sling, perineal pain requiring treatment with NSAIDs, developed in both our patients. However, perineal pain could be completely controlled with NSAIDs in the short term. In addition, dysuria has been described in 10% of cases[5]; although urinary retention developed in patient 1 on the day after surgery day 1, it rapidly resolved. Mesh infection appears to be a rare complication but developed in patient 2. No cause could be identified, except, perhaps for the operation time of 4 hours. Furthermore, fistula caused by mesh infection can be difficult to close and may necessitate mesh removal.

We created bone-anchored slings with the InVance™ system in 2 patients with urinary incontinence after radical prostatectomy. Although importation of the bone-anchor technology was necessary, the technique is simple, and the operation is useful because the curative effect is high. A larger number of cases and longer follow-up are needed to clarify the complications and long-term results of this method.

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