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Modified Raz operation backed with periurethral roll mesh in female stress urinary incontinence

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Abstract. – OBJECTIVES: With the modifications that we made, the aim is to increase the effectiveness and the success rate of the Raz operation in the treatment of stress urinary incontinence (SUI) and to present a new approach in the treatment by reducing the complication rates.

PATIENTS AND METHODS: Between November 2002 and December 2010, the Raz operation that we modified with the changes such as the placement of cystostomy catheter with the Lowsley clamp, vaginal incision of the bilateral oblique, the placement of periurethral roll mesh, the use of a single 0-degree stamey needle instead of a double needle applicator, binding the sutures mutually and on the support of the polypropylene mesh in suprapubic region was performed to 81 female patients with SUI in lithotomy position under the regional anesthesia.

RESULTS: We performed the modified Raz operation to 81 female patients with SUI, who had the complaint of urinary incontinence with the effort lasting for about 4.5 years (between 1-16 years) and whose ages were 28-83 years (mean 55.2 years), childbirth numbers were 0-11 (mean 4.8), weights were 60-85 kg (mean 69.3 kg), and 32 of whom (39.5%) were of grade 1, 49 of whom (60.5%) were of grade 2 with the anamnesia of SUI, and whose stres test was (+) in the physical examination. While the duration of the operation was 39.8 minutes (20-85 minutes) and the duration of the hospitalization was 2.9 days (2-4 days), the duration of the stay of the patients with the cystostomy catheter was determined to be 4.8 days (3-11 days). We found the rate of our success as 93.8% according to the objective criteria.

CONCLUSIONS: With the modifications that we made, we increased the success rate of the Raz operation and reduced the rates of the complication. We believe that the place of our modification method in incontinence surgery becomes more clearly with the comparison of the other anti-incontinence surgery techniques in patient groups with the same characteristics.

Key Words:
Stress urinary incontinence, Raz operation, polypropylene mesh, fibrosis.

Introduction

As a result of a sudden increase in intra-abdominal pressure, the anatomical incontinence has made up 90-95% of stress urinary incontinence (SUI) which has been defined as involuntary urinary incontinence. However, the anatomic SUI has made up the three-quarters of all women with urinary incontinence[1].

Anatomical SUI has occurred as a result of the reduction of pelvic support of the urethra and bladder due to the birth trauma, hysterectomy, hormonal changes, pelvic denervation and congenital causes[2]. The aim in the surgical treatment is to prevent the incontinence by fixing the bladder neck and urethra in high retropubic position[3]. However, the alternatives of surgical treatment are in the form of the methods such as the operations of Burch and Marshall-Marchetti-Krantz via the abdominal route; the suspension of Raz bladder neck, Raz anteriorvaginal Wall sling, needle suspension methods of Pereyra, Stamey and Gittes, Tension-free vaginal tape (TVT), Trans obturator tape (TOT) via the vaginal route; and also the methods of laparoscopic suspension, periurethral injection (Collagen, Teflon, Autologous fat and blood) and the methods of artificial urinary sphincter (4.5). New treatment alternatives are presented in the treatment of the SUI for each passing day. We also performed the SUI in our patients by modifying the suspension of the Raz bladder neck.

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Materials and Methods

Between November 2002 and December 2010, 81 patients with anatomic SUI were treated with this technique. The patients before the operation were questioned in terms of the detailed incontinence anemnesia, age, weight, the number of birth, menopausal status, the presence of chronic disease, incontinence and gynecological operations undergone previously. Cystocele, rectocele, the presence and degree of enterocele, the test of stress, and neurological examinations were performed. In laboratory examinations, routine blood biochemistry urinalysis and culture antibiogram was evaluated radiological and urodynamic evaluations were performed.

In the anemnesia of incontinence, the rate of the SUI of the patients was done and the symptoms of concomitant voiding dysfunction were questioned. According to the degree of incontinence, the patients were classified as grade 1: urinary incontinence with heavy exercise, grade 2: urinary incontinence with mild exercise, grade 3: continual urinary incontinence.

We performed the test of stress to the patients when the bladder was full, in the position of lithotomy, by having them strained and coughed. We evaluated the patient group who had the urinary incontinence with the stress maneuvers as a patient group eligible for the surgery. In this patient group, we observed if there was the urinary leak in the patients as a result of the stress maneuvers by lifting the bladder neck through the vaginal channel with our finger. If we didn't observe the urinary leak, we would accept that the test was positive (+) and the patient benefited from the suspension of the bladder neck.

Surgical Technique

We carried out the operation with the help of 30° lens and 20F of sheat cystoscope (K. Storz, Tuttlingen, Germany), 2 piesces of Polypropylene sutures with number 1 (Ethicon Inc., Bridgewater, NJ, USA), 2 pieces of polypropylene mesh prepared in the form of 2 cm-length roll, Lowsley clamp and 0° of Stamey needle (Figure 1). Operation was performed under the regional anesthesia and in the position of lithotomy. 16 F of the urethral Foley catheter was placed into the bladder and then, the bladder was filled with 200 ml of the serum physiologic. Then, the urethral Foley catheter was removed from the urethra and it was delivered to the Lowsley clamp bladder as a retrograde. By fixing

Figure 1. The main materials we used in the operation.

the clamp of s.pubisin above 1 cm, the tip of the clamp was brought to the skin by passing from the skin and subcutaneous tissue with the help of a scalpel (Figure 2). Then, 16 F of Foley catheter as a cystostomy catheter was placed to the bladder with the help of a clamp and after its balloon was inflated for 5 ml, it was fixed to the skin. Afterwards, the urethral Foley catheter was inserted and the bladder neck was determined after the bladder was drained and taken to the traction. Then, bilateral oblique incisions were made so that the side of the anterior vaginal wall would be equivalent to the bladder neck and mid-urethra. Periurethral, pubocervical fascia and ureteropelvic ligament were revealed. Then, it was passed from all of these structures and the vaginal wall (bladder neck and at the level of midüretra) without including the vaginal epithelium with the round-pinned polypropylene with num-

Figure 2. Insertion of the catheter of cystostomy with the help of Lowsly clamp.

ber 1 (non-absorbable, monofilament suture) for 3 times in the type of helical. The prepared mesh of polypropylene roll was placed in between the helical sutures (Figure 3). The same procedure was also performed for the opposite side. Then, about 3 cm of the transverse incision was performed to the suprapubic area and the rectus abdominis fascia was reached after the fatty tissue was passed. 2 cm from the lateral to the midline in the suprapubic area, it was passed through the rectus fascia with a flat-Stamey needle, and it was gotten to the incision line in the front wall of the vagina by licking the pubic bone in the guidance of our index finger in the line of the vaginal incision. Soon after that, it was checked whether the needle passesed through the bladder by performing cystoscopy. If the needle was passed, the process would be repeated. The two ends of the sutures which were thrown onto the anterior vaginal wall were attached to the tip of the needle and then it was brought over the rectus fascia. After the same procedures were also applied to the opposite side, both of the incisions in the vaginal wall were closed with 3/0 of vicryl. Following, the sutures brought to the suprapubic region with the help of Stamey needle were connected under the control of urethroscopy by putting the polypropylene mesh between the rectus fascia and the sutures without being more stretched so that they would be inter-crossed on the rectus fascia (Figure 4). It was observed that it rose in the urethroscopy which was performed after the connection of the sutures, the the bladder neck and proximal urethra of which were low and open before the suspension (Smile configuration). Then, 16 F of the urethral catheter was

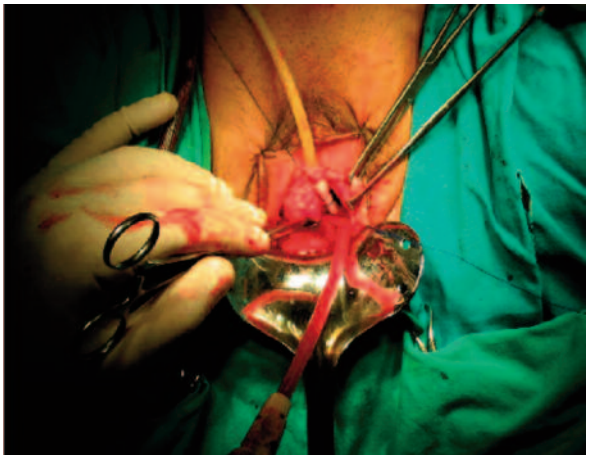

Figure 3. Insertion of periurethral-roll mesh among the helical sutures.

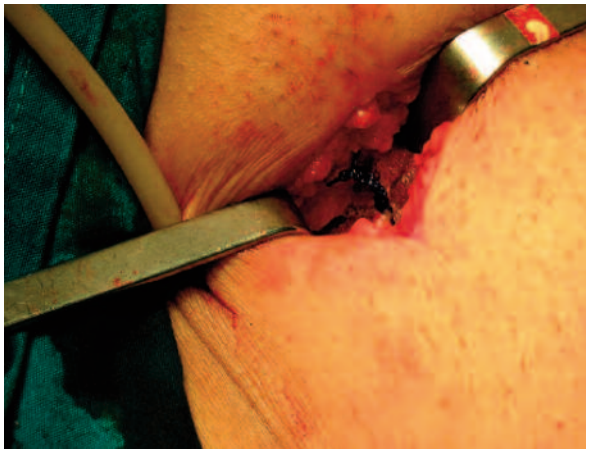

Figure 4. Binding of the sutures mutually on the polypropylene mesh in the suprapubic region.

inserted by closing the suprapubic incision. Also, the repair of cystocele and rectocele was done in the patients with cystocele and rectocele except for grade 1. The operation was ended by placing the tampon with betadine into the vagina.

Post-operative Period

Vaginal tampon was removed the 1st day post-operative, but the urethral catheter was removed the 2nd day post-operative. Following the removal of the catheter, the measurement of residual urine was done and by removing the cystostomy catheter of the patients below 100 ml, the follow-up with the cystostomy catheter was continued for those over 100 ml until it droped below 100 ml. Until the urethral catheter was drawn up, an antispasmodic agent and povidone-iodine vaginal ovule were admistrated as 1 × 1 in the dose of night for 5 days after the surgery.

Follow-up

After the withdrawal of cystostomy catheter of the patients in the 7th day of postoperative, their follow-up of 7th day, 3rd month, 6th month, 12th month, 18th month, 24th month, 36th month, and 60th month was done. The anamnesia of urinary incontinence, the test of stress, urinalysis and urine culture were evaluated during the controls. The urodynamic examination was performed to those with the SUI or symptom of voiding dysfunction. While the improvement and failure were assessed, subjective criteria according to the patient's anamnesia (complete recovery; absence of the symptom of incontinence, recovery; rare symptom of incontinence, failure; frequent or continuous symptom of inconti-

nence) and objective criteria were taken into consideration according to the result of the test of stress (success; absence of urinary incontinence in full bladder in the position of lithotomy and standing with the stres maneuvers and failure; presence of it).

Results

The ages of the patients were between 28-83 years (mean 55.2), the numbers of childbirth of them were between 0-11 (mean 4.8), their body weights were between 60-85 kg (mean 69.3 kg). The number of postmenopausal patients was 35 (43.2%) and 23 of 81 patients were chronic cigarette smokers, 7 of them were DM, and 8 of them had chronic obstructive pulmonary disease. The operation of vaginal hysterectomy was performed to 7 patients previously, and it was benefited from the vacuum in the childbirth of 12 patients. The patients had the complaints of urinary incontinence lasting with the effort for average 4.5 years (1-16 years). While 32 of 81 patients (39.5%) had grade 1 and 49 (60.5%) of them had the SUI anamnesia of grade 2, there was urge incontinence accompanying with the event in 25 (30.9%) patients. In the cystometric examination which was done, detrusor hyperactivity was not detected in none of these patients.

As a result of the physical examination which was done, the test of stress was positive (+) in all of the patients who were found to be eligible for the surgery. There were the cystocele of grade 1 in 18 patients, cystocele of grade 2 in 42 patients, cystocele of grade3 in 9 patients. In addition, there were the rectocele of grade 1 in 24 patients, and rectocele of grade 2 in 33 patients. While the rate of cystocele was 85.2% in our series, rectocele was observed at the rate of 70.3%. We repaired the cystoceles and rectoceles, larger than the grade 1 at the same session.

The mean operation time was 39.8 minutes (20-85 minutes) and the mean duration of hospitalization was 2.9 days (2-4 days), but it was found that the mean duration of the patients staying with the cystostomy catheter was 4.8 days (between 3-11 days). There was no need of the intermittent catheterization in any of the patients.

The success rates were given in Table I according to the subjective and objective criteria. Our success rates were reported in Table II according to the demographic characteristics of the patients. We achieved 94% of success in pre-

Table I. Our subjective and objective success rates.

	Case number	Success rate (%)
Subjective		
Full recovery	71	87.6
Recovery	6	7.4
Unsuccessful	4	5
Objective		
Successful	76	93.8
Unsuccessful	5	6.2

menopausal group and 65% of succes in postmenopausal group. While the incontinence was improved in 8 of 12 patients performed the vacuum in their childbirth, it was seen that it continued in the other 4. The incontinence of the others continued while the incontinence of 3 of the patients performed the hysterectomy was improved. As a result, the history of pelvic surgery was found to be 75% in unsuccesful cases and 12% in successful cases.

The cystometric examination was performed to all of the cases which failed objectively and subjectively after the operation. But, the detrusor hyperactivity was observed in none of them.

In the period after the surgery, infection developed in the place of suprapubic incision in one patient but in the lower urinary tract in 4 patients. Infections were treated with the appropriate antibiotics according to the results of culture antibiogram.

Discussion

SUI is a disease that has quite commonly been encountered in adult female population,

Table II. Evaluation of successful and unsuccessful cases according to the demographic characteristics.

	Successful cases	Unsuccessful cases
Age	46.6 (28-64)	63.8 (48-83)
Birth	4 (0-6)	5.6 (2-11)
Weight	64.2 (60-75)	74.4 (63-85)
Menopause	32 (42.1%)	5 (100%)
Grade 1 SUI	31 (40.8%)	1 (20%)
Grade 2 SUI	45 (59.2%)	4 (80%)
Duration of complaint (year)	2.9 (1-12%)	6.1 (2-16)
Cystocele	64 (84.2%)	5 (100%)
Rectocele	54 (71%)	3 (60%)
Urge incontinence	22 (28.9%)	3 (60%)

affects the social lives of the patients and leads to the marked disorder[6]. The surgical procedures over 100 have been described from the suprapubic cystostomy onto the present-day that Baker and Brown described for the SUI surgery in 1864[7]. Although there are so many surgical procedures, there is not a complete partnership about setting the indication and about what procedure the most effective is in the SUI surgery. The ideal surgical treatment must be effective, low-risk and long-acting and must provide a good quality of life for the patients[10]. In addition, the cost of the surgery has also emerged for less developed or developing countries which cannot allocate enough fund for health. The ideal operation for the patients is decided according to the patient's age, menopausal status, weight, concomitant pelvic prolapse, presence of urethral scar and in the accompaniment of urodynamic examinations we would perform in the patients if necessary and then, the optimal surgical approach for the patients must be determined[7].

The methods of transvaginal needle suspension have entered the SUI surgery methods for the first time in 1959, when Pereyra showed through a special needle that the paraurethral tissue can be suspended to the abdominal fascia[8] In the methods of transvaginal needle suspension, the morbidity rate before and after the surgery has been low since there is no need to open the anterior abdominal fascia and to dissect the retropubic region[9]. In addition, it has acquired a very important place in the SUI surgery due to the advantages such as the duration of shorter hospitalization, low rate of pain, a quick return to the normal life and also the ability to repair the concomitant pelvic prolapse (cystocele, rectocele, enterocele, uterine prolapse)[8]. The success rates in the methods of needle suspension have varied between 40 and 100%. In the studies that the needle suspensions were compared with the other methods, it has been observed that the methods of colposuspension were more effective and had similar success rates with the anterior colporrhaphy and sling operations[10]. However, the failure in the needle suspensions has been linked to not putting the sutures of the suspension into the proper place, improper use of the suture, binding the sutures very tightly, early and excessive mobilization after the operation, improper patient selection and the problems in healing of the tissue[11,12].

Raz operation which is one of the methods of the needle suspension has been preferred because of its easy learning and teaching, low morbidity, short duration of the operation and hospitalization, patient satisfaction, the implementation in selected cases even with the regional anesthesia. It is studied as transvaginal and suprapubic in combination in the method of the bladder neck suspension that Raz described. "Inverted U incision" is performed to the anterior vaginal wall, and the ureteropelvic ligament, periurethral and pubocervical fascia is presented. 2-3 cm of the skin incision made in the suprapubic area is driven up to the rectus fascia. Then, non-absorbable monofilament sutures, so that they would not contain the vaginal epithelium, passed from all of the structures and the vaginal wall for 3-4 times in a helical manner are connected by being brought to the suprapubic area through a special "Double-needle applicator" transmitted from the suprapubic region. The cystoscopy is performed during all these processes.

We modified this incision by using bilateral oblique incision instead of the U-incision implemented to the vaginal anterior wall. Our purpose to do this was was to cause less tissue damage and less hemorrhage and to protect the support of the anterior vaginal wall much more.

It was observed that full-folded sutures performed to the anterior wall of the vagina at the level of the bladder neck cut the vaginal walls soon after they were connected in the suprapubic fatty tissue under a certain tension. As a result, the anterior vaginal wall has come the neutral position by decreasing the tension and slowly descending to the down. However, a natural fibrous tissue has occurred with the stimulation of the fibroblastic activity on both sides during the upwards movement of the sutures. This scar tissue which has occurred has been an autologous support for the bladder neck showing the effect as an internal pillow. In the method that we performed, the roll polypropylene meshes that we placed under the helical sutures that we passed from the periurethral fascia, pubocervical fascia, ureteropelvic ligament and anterior wall of the vagina (without the vaginal epithelium) have supported the pelvic floor in a regular form thanks to the effects such as the mechanical effect they made, providing the formation of fibrous tissue by increasing the fibroblastic activity, providing the support for the anterior vaginal wall, keeping the suspension sutures of the bladder neck in a certain tension which were performed. We think that

our modification which has been the basis for the method provides a more powerful and longer-term pelvic support.

However, soon after the superior part of the suspension sutures were knotted from the place of the suprapubic incision inwards, it has cut the suprapubic fatty tissue and over time, the sutures have strongly been detected with the rectus fascia and muscle. Raz et al reported that binding the sutures very tightly not only would provide any positive contribution to the success of the operation, but also they will be able to cause the failure by breaking down the tissues. In addition, as a result of binding tightly, Raz et al has reported that the urethral obstruction and the rate of pain were also high[11]. For these reasons, by putting the polypropylene mesh in between the sutures and the fascia on the rectus fascia in the suprapubic area, we tied the sutures in proper tension on the polypropylene mesh by doing the control of the cystoscope. With this modification that we applied by putting between the rectus fascia and the sutures, we, thanks to the polypropylene mesh, provided the advantages such as less tissue damage, less pain due to the micturition after the surgery, providing the proper suspension tension more comfortably.

In original procedure of Raz et al, the two ends of the suture which were performed to the vaginal wall have been brought to the suprapubic area with the help of "Double needle applicator", and the two ends of the suture have been attached to each other on the same side and the same process has been applied to the other side. However, while we took the sutures upwards that we applied to the vaginal wall, by passing just once with the single Stamey needle, we modified the original method in the form of the two sutures' binding with each other on polypropylene mesh over the rectus fascia after taking the two ends of the suture upwards at the same time, and also applying the same process to the other side. Thanks to binding the sutures mutually, we thought that, by creating a balanced tension between the two suture lines, we could lift the bladder neck and proximal urethra to the retropubic area in an equal height and as a result, might provide a more effective suspension.

Double needle applicator used in the operation of the original Raz et al is an applicator with two-needle. With our modification of the use of Stamey needle instead of double needle applicator, we thought that we would be able to reduce the rate of the emerging damage to the lower urinary tract. We did not observe these complications in our series. The rates of the bladder injury in the methods of transvaginal needle suspension in the literature have varied between 6 and 11%[13,14].

Another advantage of our usage of a single-Stamey needle instead of double needle applicator was to reduce the complication rate of a possible ilioinguinal nerve entrapment, so that the two ends of the suture on the same side would be close to each other by taking to the suprapubic region. In the methods of transvaginal needle suspension, the entrapment of the ilioinguinal nerve has been able to be observed with the direct damage of the passed needle or with the effect of the sutures of the suspension that serve as a hanger from the vaginal wall towards the rectus fascia[13]. This complication has been observed in 16% of the patients performed the methods of the needle suspension. Ilioinguinal nerve can easily tighten from the superficial inguinal ring near the outlet on the pubic tubercle[9]. To prevent this, it has been reported that the needle should be passed through the medial of the pubic tubercule[9]. While there were the publications mentioning that this complication was observed around 5-19%, we did not encounter such a complication in our series[9,13].

The deficiency of estrogen has an important role in the etiology of SUI[4]. In our study, we provided 94% of success in pre-menopausal women and 65% of it in post-menopausal women. Our findings have also supported the view that the resistance and integrity of the vaginal mucosa played an important role in the success of the operations of transvaginal needle suspension in the literature.

One of the most important factors in the development of SUI is the damage of pelvic floor during the vaginal birth[4]. In the end of the studies which were done, the relationship between the high birth weight, length of the 2nd level of the birth and the damage of pelvic floor has been shown as an electromyographic[15]. It has been reported that 80% of the partial denervation of the pelvic floor in women occurred during the 1st child[16]. While the average number of the birth in our successful cases was 4, it was 5.6 in unsuccessful cases. There were the prolonged travail and the anamnesia of vacuum application in the half of our patients who failed.

Obesity plays an important role in the success of the surgical treatment of SUI It has been reported that the chance of the success was low in patients with 85 kg ↑ and, however, there was

no significant difference in terms of the success rates among those with mild or moderate-weight who are non-obese[17]. The results in our study are also in the direction supporting this opinion. While the average weight in our successful group was 64.2 kg, it was 74.4 kg in our unsuccessful group.

Obstructive voiding symptoms have usually been observed after the surgery of SUI done as the retropubic or transvaginal. The most important etiological factors in post-operative urinary retention are placement of the suspension sutures to the quite distal or the "suture malposition" observed as a result that the suspension sutures pass to the urethra very closely. Apart from this, the closure of the urethra by the sutures being tightly binded, passing of intraurethral suture, pelvic hematoma and vaginal or urinary infection have been able to lead to the obstruction[11,18,19]. Urinary obstruction is observed more in the early period of post-operation in the methods of transvaginal needle suspension compared to the retropubic methods. Especially after the sling operations, it has taken quite a long time to return to normal micturition[9,18]. The urinary retention did not develop in any of our patient. The longest catheter of the cystostomy stayed for a period of 11 days. We did not have to apply the intermittent catheter to any of our patient.

The findings of the detrusor instability (DI) are available in 9-52% of women with the SUI[20]. It was found that the DI was recovered in 2/3 of the cases in post-operative period[21]. In our series, we also found that the urge incontinence that we detected at a rate of 30.9% in pre-operative period improved at a rate of 67% in post-operative period. In addition, de-nova DI developed in 8 cases (9.9%) without any signs of instability before the operation, and thus, it has been reported that this complication may develop at the rate of 7-28% after the SUI surgery[22]. Our cases improved with the anticholinergic therapy.

Conclusions

Raz et al operation which was in the methods of transvaginal needle suspension has been a preferred method due to its advantages such as the short surgery and the duration of the hospitalization, higher efficiency, lower morbidity rate, lower cost, learning, teaching and ease of the application. Thanks to the mesh of periurethral roll that we used in our modified methods, we increased the success rate of our method with the effects such as the increased pelvic support, the stimulation of fibrosis and we reduced the rates of the complication with the suprapubic mesh that we used and the needle of Stamey.

We believe that the place and success of the modifications in surgical treatment that we made will be clearer in patient groups with the same characteristics as a result of the studies which will be done in comparison with the other anti-incontinence surgical techniques.

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