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Novel technique of laparoscopic mid-urethral autologous rectus fascial sling for stress urinary incontinence.

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Abstract

Serious concerns have been raised over safety of vaginal mesh tapes for stress urinary incontinence (SUI). Autologous rectus fascial sling and the more recent "sling on a string" through a laparotomy are gaining popularity as native tissue options for SUI. We describe a novel technique of laparoscopic mid-urethral autologous rectus fascial sling for SUI. Ten patients underwent this new technique safely. At six months, all subjects reported cure of SUI with normal voiding. The advantages of this technique include the minimal access approach, introduction of the sutures under laparoscopic guidance, and avoidance of over tightening of the sling.

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Novel technique of laparoscopic mid-urethral autologous rectus fascial sling for stress urinary incontinence.

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Abstract:

Serious concerns have been raised over safety of vaginal mesh tapes for stress urinary incontinence (SUI). Autologous rectus fascial sling and the more recent "sling on a string" through a laparotomy are gaining popularity as native tissue options for SUI. We describe a novel technique of laparoscopic mid-urethral autologous rectus fascial sling for SUI. Ten patients underwent this new technique safely. At six months, all subjects reported cure of SUI with normal voiding. The advantages of this technique include the minimal access approach, introduction of the sutures under laparoscopic guidance, and avoidance of over tightening of the sling.

Key words: Vaginal mesh, Tension free vaginal tape, minimal access surgery, mesh complications, urodynamics, colposuspension, transobturator tape, mini sling.

Main text:

Introduction:

Stress urinary incontinence (SUI) is a common condition that has a significant impact on quality of life. The integral theory showed that defective mid urethral support and the resultant low urethral pressure are the main mechanism behind stress urinary incontinence[1]. Concerns have been raised about safety and long-term complications of vaginal mid-urethral mesh tapes. As a result, there has been a resurgence in native tissue surgical management of female stress urinary incontinence. Autologous fascial sling (AFS) was described almost eighty years ago[2]. Despite its high success rate, this procedure, however, requires a laparotomy, and is associated with high rates of voiding dysfunction post operatively[3]. More recently the concept of a sling on a string was introduced using a laparotomy, with blind introduction of the strings using a special curved needle[4]. The ends of the strings are then sutured to the rectus fascia. In this prospective cohort study, we evaluate the feasibility, safety and one year outcomes of the novel technique of laparoscopic mid-urethral autologous rectus fascial sling insertion (LMAFS) for SUI. We also a provide video demonstration of the technique described in the manuscript.

Methods:

We conducted prospective evaluation of patients with bothersome stress urinary incontinence who underwent laparoscopic mid-urethral autologous rectus fascial sling insertion (LMAFS). We included women 18 years of age or older, who had predominant symptoms of stress urinary incontinence, who failed conservative treatment. All patients filled the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-SF) questionnaire pre and post operatively. On examination, all patients had positive cough test, defined as leakage of urine with bladder filled to least 300 ml of urine (measured by ultrasound bladder volume evaluation). All patients had hypermobile bladder neck and urethra on coughing or maximum valsalva. All patients underwent urodynamic evaluation by multi-channel cystometry. All patients had urodynamic stress incontinence, with normal voiding and no evidence of detrusor overactivity. Post operatively, patients filled the Patient Global Impression of Improvement Questionnaire (PGII)[5] and the ICIQ-SF. Success was defined as response of "very much better" or "much better" on PGII. All other responses were considered treatment failure. Institutional review board (IRB) approval was obtained prior to study, and informed consent was obtained from each participant.

Surgical technique:

We describe a novel technique of laparoscopic mid-urethral autologous rectus fascial sling insertion (LMAFS) under laparoscopic guidance using rectus sheath fascia in managing stress urinary incontinence. 4 cm trans-

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verse lower abdominal incision is made and a strip of rectus fascia is harvested measuring 6x2 cm (Figure 1). The small wound is then closed. A sling on a string is then formed using permanent suture material, which are sutured to both ends of the sling. A vaginal incision is made 1.5 cm from the external urethral meatus. Para urethral tunnels are then created with dissecting scissors. After routine laparoscopic entry with two accessory ports, the retropubic space is opened and the bladder is dissected down. The endopelvic fascia is then perforated under laparoscopic guidance either side of the urethra with scissors (Figure 2). The sutures on the end of the sling are then passed into the retropubic space, and sutured to the Coopers ligaments after tension-free adjustment of the sling under the mid urethra. The vaginal skin is then closed with interrupted absorbable sutures and cystoscopy is performed to check bladder and urethral integrity.

Results:

We prospectively evaluated 10 patients with urodynamic stress incontinence, two of them had previous colposuspension, who underwent LMAFS. Operative time ranged from 90-150 minutes. All women were discharged home 24 hours after surgery after they resumed normal voiding. No perioperative complications were reported. All patients were reviewed at 12 months post operatively. At 12 months, all patients reported cure of their SUI symptoms, defined according to their answers to the ICIQ-SF questions 3 and 4 as "never" on the question of "how often do you leak urine?", and "none" on the question "how much urine do you usually leak?". None of the participants reported complaints of voiding dysfunction nor new onset overactive bladder. All patients reported feeling "much better' or "very much better" on the PGI-I questionnaire. We reported no wound related complications nor blood transfusions.

Discussion:

To our knowledge, this is the first description of the technique of laparoscopic autologous rectus fascial sling insertion under the mid urethra (LMAFS) to treat female stress urinary incontinence. We demonstrated the feasibility and safety of the technique. The advantages of this technique include the small incision in the lower abdomen, with much quicker recovery and reduced wound complications, introduction of the sutures holding the sling under direct laparoscopic guidance, which avoids the complication of bladder, bowel, nerve and vascular injury with blind introduction of the needles. This is particularly important in cases of previous surgery for urinary incontinence where the bladder can be adherent to the pelvic bone. Furthermore, fixation of the strings to the Coopers ligaments maintains the sutures original tension and allows accurate tensioning of the strings, and avoids over lightning of the sling and voiding dysfunction, which can occur with the attachment of the sutures to the rectus fascia.

The safety of mesh devices has been the subject of substantial scrutiny over the past decade owing to patient reports of adverse events during extended follow-up, including tape or mesh exposure, groin or thigh pain, and dyspareunia, with lawsuits filed against mesh manufacturers in various countries[6]. A recent randomised controlled study by Abdel-Fattah et. al. showed that mini slings were non-inferior to mid-urethral slings in efficacy in managing SUI[6]. Efficacy, however, was not the reason behind suspension of mesh mid urethral slings in the United Kingdom, but rather concerns over safety and complications. In our technique, the autologous nature of the graft used as mid urethral sling, avoids the mesh related complications of synthetic tapes. Side effects and complications related to mesh use continue to be a major cause of concern, being reported in up to 9.4% of women following mid urethral mesh tape insertion[7]. Abdel Fattah et. al. reported the same complications related to mesh including vaginal mesh erosion, chronic groin and thigh pain, and revision surgery needing mesh removal[6]. The above complications were the main reasons behind suspension of the mid urethral mesh tapes in the United Kingdom (ref 6). Hence, surgeons and patients have been looking for non-mesh native tissue surgical options for management of stress urinary incontinence. These options include urethral bulking agents, colposuspension (open or laparoscopic) and the autologous fascial sling. Colposuspension, increases the risk of new onset vaginal prolapse (rectocoele) due to the access of traction by the suspensory sutures of the vagina.

According to the integral theory[1], restoring mid urethral support is the most anatomically sound method for treatment of SUI, which has repeatedly shown to be successful in treating SUI with the use of mid

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urethral tapes. The traditional autologous fascial sling can achieve this but is associated with complications, including high rates of voiding dysfunction, especially as the original techniques involved placing the sling under the bladder neck, rather than the mid urethra[2, 3], the need for major abdominal surgery (as shown in the video of this technique by Asfour et. al.[4]), with resultant wound related complications and prolonged recovery, particularly in patients with raised body mass index. Furthermore, blind introduction of the ends of the fascial sling increases the risk of visceral perforations. We believe that attaching the strings (sutures) to the Cooper's ligament as a fixed structure is advantageous to attaching the strings to the rectus fascia, which can alter the tension of the sling as the wound is healing with resultant swelling, or loosening of the tension as the rectus fascia gets weaker with age. The novel technique described in this paper and video provide major benefits to patients as described above, and provide the peace of mind of avoiding the short and long-term complications of mesh insertion.

There are limitations to this paper, including the difficulty in assessing the learning curve needed before reaching competence in this technique. Furthermore, the follow up reported here is the 12 months follow up, and although the follow up data have been reassuring, we plan to annually review our patients for any medium to long term recurrences.

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Figure legends:

Figure 1: Graft harvesting.

Harvesting a 6x2 cm autologous rectus fascial sling through a 4 cm transverse lower abdominal incision.

Figure 2: Entering the retropubic space with laparoscopic guidance.

After the vaginal incision, para urethral dissection is performed to enter the retropubic space under laparoscopic guidance.

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