

Tailor-Made Mesh for Pelvic Organ Prolapses: Correlation between Patient's Height and Mesh Size

Hideki Kobayashi^{1*}, Yaburu Haneda¹, Satoru Kira¹, Takayuki Tsuchida¹, Isao Araki²,
Masayuki Takeda¹

¹Department of Urology, University of Yamanashi, Chuo City, Japan

²Department of Urology, Shiga University of Medical Science, Ōtsu, Japan

Email: ¹hidekik@yamanashi.ac.jp

Received January 23, 2013; revised February 25, 2013; accepted March 4, 2013

Copyright © 2013 Hideki Kobayashi *et al.* This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Tension-free vaginal mesh (TVM) surgery is a common and minimally invasive procedure for pelvic organ prolapses. Since commercial kits are not readily available in Japan, we have planned tailor-made mesh by information of each patient before every TVM surgery. The aim of this report is to inform methods to design mesh for individual patients with pelvic organ prolapses. We also investigated the correlations among mesh size and height, weight, and body mass index (BMI). Before the operation, we obtained a KUB (abdominal X-ray). Three factors were measured from this X-ray: the first was the distance between the bilateral ischial spine, the second was the distance between the obturator foramen, and the third was the length of the arcus tendineus fascia pelvis (ATFP). These three factors always should be considered for designing of mesh. The correlations among the bilateral ischial spine distance, obturator foramen distance, ATFP length, height, weight, and BMI were assessed using the Pearson correlation coefficient. Although these three factors described above are necessary to design a mesh for individual patients, the bilateral ischial spine and obturator foramen distance correlated with the height of the patient. On the other hand, since the length of ATFP differs in each patient and is not correlated with height, we should consider this length when we design the mesh. Well-designed, tailor-made mesh will probably fit each pelvic organ prolapsed patient very well.

Keywords: Pelvic Organ Prolapses; Surgery; Tension Free Vaginal Mesh; Tailor-Made Mesh; Mesh Size

1. Introduction

Tension-free vaginal mesh (TVM) surgery is a common and minimally invasive procedure for female patients with pelvic organ prolapses (POP) [1-6]. In 2004, this procedure was developed by a French group [1]. Since a standardized surgical kit has not been approved by Japanese Government, we have been making a ready-made sized mesh which had been designed from French women. Hence, above mesh is too big for average Japanese women. From 2009, we have planned to make tailor-made mesh by information of each patient before every TVM surgery. Combination of our original, well-designed, and tailor-made mesh and good surgical skill has shown better clinical course without serious complications.

The aim of this report is to inform methods to design the mesh for individual patients with POP. We also investigated the correlations among mesh size and height,

weight, and body mass index (BMI).

2. Material and Method

Before the operation, we obtained a KUB (abdominal X-ray). Three factors were measured from this X-ray (**Figure 1**): the first was the distance between the bilateral ischial spine, the second was the distance between the obturator foramen, and the third was the length of the arcus tendineus fascia pelvis (ATFP). Since the ischial spine is located in a more posterior position than the symphysis of the pubic bone, the actual length of the ATFP is slightly longer than that determined in the X-ray. Although the shape of tailor-made mesh is closely resembles ready-made uniform, we always rearrange the mesh size based on these three parameters.

A total of 56 female patients who have undergone TVM surgery in our institute were consecutively enrolled to investigate whether there is the correlations among the bilateral ischial spine distance, obturator foramen dis-

*Corresponding author.

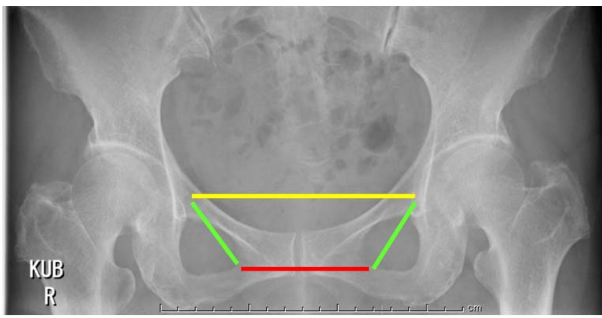


Figure 1. Three parameters are measured from the KUB (abdominal X-ray) before the every TVM surgery. Yellowish line indicates the distance between the bilateral ischial spine, red line indicates the distance between the obturator foramen, and green line is the length of ATFP.

tance, ATFP length, height, weight, and BMI. Statistical significance was evaluated by the Pearson correlation coefficient using conventional software (Excel), and p values < 0.05 were regarded as statistically significant.

3. Results

Height was correlated with both the bilateral ischial spine and obturator foramen distance ($r = 0.4662$, $p = 0.0003$ and $r = 0.4186$, $p = 0.0013$, respectively) (Figures 2 and 3). Weight was also correlated with both the bilateral ischial spine and obturator foramen distance ($r = 0.3898$, $p = 0.003$ and $r = 0.3016$, $p = 0.0239$, respectively). Height is well concerned with these two parameters than weight.

The bilateral ischial spine distance was correlated with the obturator foramen distance ($r = 0.4725$, $p = 0.0002$). Interestingly, the length of the ATFP was not correlated with height (Figure 4). BMI was not correlated with any of these three parameters.

4. Discussion

Although these three factors described above are necessary to design a tailor-made mesh for individual patients, the bilateral ischial spine and obturator foramen distance correlated with the height of the patient. On the other hand, since the length of ATFP differs in each patient and is not correlated with height, we should consider this length when we design the mesh. Anatomically, this length means the length of anterior vaginal wall.

So especially, in case of TVM-for anterior vaginal wall, we take best care of puncture point of ATFP. Although the length of ATFP differs from patient, when the distance between the first and second puncture points is short, there is a possibility that the second puncture is not near the ischial spine, or otherwise the first puncture is not near the inside of obturator foramen. In fact, a reasonable distance and corresponding designed mesh is important for good mesh positioning for each patient [7].

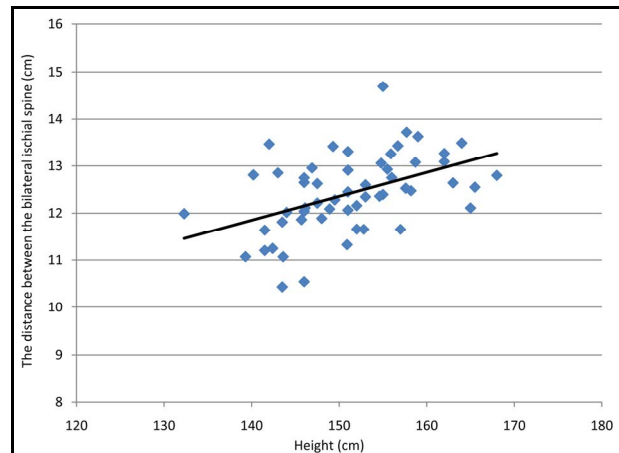


Figure 2. Correlation between height and both the bilateral ischial spine distance ($r = 0.4662$, $p = 0.0003$).

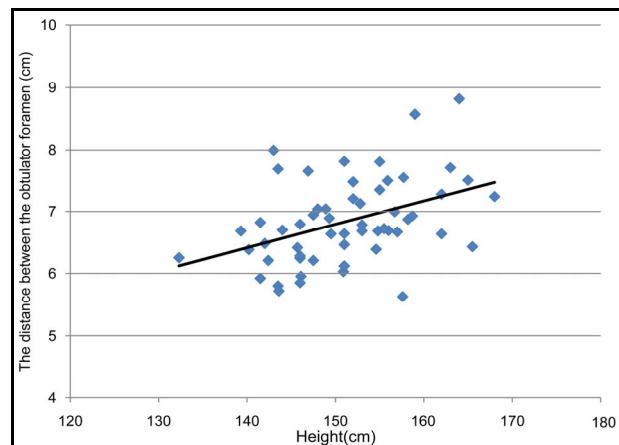


Figure 3. Correlation between height and both the bilateral obturator foramen distance ($r = 0.4186$, $p = 0.0013$).

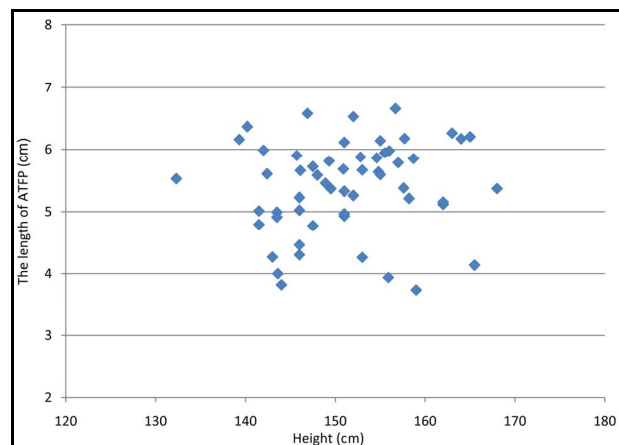


Figure 4. Correlation between height and the length of the ATFP (not concerned).

If the mesh size was too big, it might be a cause of wrinkled mesh after surgery. On the other hand, if the mesh size was too small, it might be not enough for re-

construction of each pelvic floor.

In July of 2011 the US Food and Drug Administration (FDA) released a safety communication entitled “UPDATE on Serious Complications Associated with Transvaginal Placement of Surgical Mesh for Pelvic Organ Prolapse”. In this report, the most common mesh-related complication experienced by patients undergoing transvaginal pelvic organ prolapse (POP) repair with mesh is vaginal mesh erosion. Based on data from 110 studies including 11,785 women, approximately 10 percent of women undergo transvaginal POP repair with mesh experienced mesh erosion within 12 months of surgery [8]. So we should take special care when using a surgical mesh for the transvaginal repair of POP.

Since the relationship between mesh erosion and wrinkled mesh after surgery remains to be clarified, it cannot be said that tailor-made mesh is obviously better than ready made uniform. Furthermore, without comparing two types of mesh (tailor-made mesh and ready-made uniform mesh), it is not possible to say that this designed tailor-made mesh is better than ready made uniform. Studies using cohorts of two types of mesh are warranted to confirm the results of this study.

In conclusion, well-designed, tailor-made mesh will probably fit each pelvic organ prolapsed patient very well. Furthermore, our original method to design tailor-made mesh may be able to prevent mesh-related severe complications during POP surgery.

REFERENCES

- [1] P. Debodinance, J. Berrocal, H. Clave, *et al.*, “Changing Attitudes on the Surgical Treatment of Urogenital Prolapse: Birth of the Tension-Free Vaginal Mesh,” *Journal de Gynécologie Obstétrique et Biologie de la Reproduction*, Vol. 33, No. 7, 2004, pp. 577-588. [doi:10.1016/S0368-2315\(04\)96598-2](https://doi.org/10.1016/S0368-2315(04)96598-2)
- [2] M. Boukerrou, E. Lambaudie, P. Collinet, *et al.*, “Objective Analysis of Mechanical Resistance of Tension-Free Devices,” *European Journal of Obstetrics & Gynecology and Reproductive Biology*, Vol. 124, No. 2, 2006, pp. 240-245. [doi:10.1016/j.ejogrb.2005.06.040](https://doi.org/10.1016/j.ejogrb.2005.06.040)
- [3] F. Caquant, P. Collinet, P. Debodinance, *et al.*, “Safety of Trans Vaginal Mesh procedure: Retrospective Study of 684 Patients,” *Journal of Obstetrics and Gynaecology Research*, Vol. 34, No. 4, 2008, pp. 449-456. [doi:10.1111/j.1447-0756.2008.00820.x](https://doi.org/10.1111/j.1447-0756.2008.00820.x)
- [4] M. Takeyama, Y. Uesaka, S. Itoh, *et al.*, “Feasibility of the Tension-Free Vaginal Mesh Procedure Using Soft Polypropylene Mesh (Gynemesh PS) Japan,” *International Urogynecology Journal and Pelvic Floor Dysfunction*, Vol. 18, 2007, pp. S46-S47.
- [5] K. Kato, S. Suzuki, S. Yamamoto, *et al.*, “Clinical Pathway for Tension-Free Vaginal Mesh Procedure: Evaluation in 300 Patients with Pelvic Organ Prolapse,” *International Journal of Urology*, Vol. 16, No. 3, 2009, 314-317. [doi:10.1111/j.1442-2042.2008.02249.x](https://doi.org/10.1111/j.1442-2042.2008.02249.x)
- [6] S. Takahashi, D. Obinata, T. Sakuma, *et al.*, “Tension-Free Vaginal Mesh Procedure for Pelvic Organ Prolapse: A Single-Center Experience of 310 Cases with 1-Year Follow up,” *International Journal of Urology*, Vol. 17, No. 4, 2010, pp. 353-358. [doi:10.1111/j.1442-2042.2010.02469.x](https://doi.org/10.1111/j.1442-2042.2010.02469.x)
- [7] H. Kobayashi, N. Sawada, S. Kira, *et al.*, “Intraoperative Fluoroscopic Monitoring during TVM Surgery: Safer Procedure Even for Beginners,” *Open Journal of Urology*, Vol. 2, 2012, pp. 72-74. [doi:10.4236/oju.2012.22012](https://doi.org/10.4236/oju.2012.22012)
- [8] H. Abed, D. D. Rahn, L. Lowenstein, *et al.*, “Incidence and Management of Graft Erosion, Wound Granulation, and Dyspareunia Following Vaginal Prolapse Repair with Graft Materials: A Systematic Review,” *International Urogynecology Journal*, Vol. 22, No. 7, 2011, pp. 789-798. [doi:10.1007/s00192-011-1384-5](https://doi.org/10.1007/s00192-011-1384-5)