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Mussel RL, De Sa Silva E, Costa AM, Mandarim-De-Lacerda CA (2003). Mast cells in tissue response to dentistry materials: an adhesive resin, a calcium hydroxide and a glass ionomer cement. *J. Cell. Mol. Med.* 7:171-178.

Booth M, Bundy DA, Albonico P, Chwaya M, Alawi K (1998). Associations among multiple geohelminth infections in school children from Pemba Island. *Parasitol.* 116: 85-93.0.

Fransiscus RG, Long JC, (1991). Variation in human nasal height and breath, *Am. J. Phys. Anthropol.* 85(4):419-427.

Stanislawski L, Lefeuvre M, Bourd K, Soheili-Majd E, Goldberg M, Perianin A (2003). TEGDMA-induced toxicity in human fibroblasts is associated with early and drastic glutathione depletion with subsequent production of oxygen reactive species. *J. Biomed. Res.* 66:476-82.

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*Full Length Research Paper*

# Relationship between blood pressure and arterial stiffness in patients undergoing antihypertensive treatment: A pilot study

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Mean arterial blood pressure is one of the principal modifiable factors which contribute to arterial stiffness. The influence of anti hypertensive drugs on arterial stiffness measured photoplethysmographically has not yet been studied. This pilot study was aimed at exploring the relationship between blood pressure (BP) and parameters of arterial stiffness on initiating antihypertensive treatment. Fourteen newly diagnosed hypertensive male or female patients aged 30 to 40 years participated in the study. The age, height, weight and body mass index was calculated for all patients. BP and arterial stiffness were measured once before treatment and weakly after initiation of treatment for 3 weeks. On comparing the pretreatment and post treatment weakly BP values, a highly significant decline in the systolic BP ( $p < 0.006$ ) and mean BP (0.005) was observed, whereas diastolic BP showed a significant (0.016) decline. Post hoc analysis revealed that systolic BP (SBP) and diastolic BP (DBP) showed a significant decline ( $p = 0.011$  and  $0.027$ , respectively) at the second visit, which was around two weeks post treatment, while the mean BP showed a highly significant decrease ( $p = 0.009$ ) at this time. However, pulse pressure and heart rate did not change significantly with treatment. Also, the parameters of arterial stiffness did not change significantly with treatment for the same duration. Thus, we concluded that reduction in BP in hypertensive patients as measured clinically by brachial cuff sphygmomanometry seems to be dependent on the encounter interval. The decrease in blood pressure occurred within three weeks, whereas changes in arterial stiffness do not occur even till three weeks of initiating the treatment.

**Key words:** Antihypertensive treatment, photoplethysmographic arterial stiffness, encounter interval.

## INTRODUCTION

Increased arterial stiffness is a marker of cardiovascular damage, even in the absence of clinically apparent disease (Safar, 2000; Schiffrin, 2004). One of the principal modifiable factors that contribute to arterial stiffness is the mean arterial blood pressure (McEniery et

al., 2005; Protogerou et al., 2007; Segers et al., 2009). The mean arterial blood pressure has a greater impact on the small to medium sized muscular arteries, leading to high peripheral vascular resistance (McEniery et al., 2007). As is expected, with an increase in arterial stiffness the compliance of the digital arteries is decreased in patients with essential hypertension (Bochmann et al., 1995).

Although pulse wave velocity as measured by applanation tonometry is considered the gold standard for measurement of arterial stiffness (Laurent et al., 2002),

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there are several other non invasive methods of measuring the stiffness of the blood vessels. One easy to use and operator independent method is the photoplethysmographic assessment of pulse waveform, which is based on digital volume pulse (DVP) (Millasseau et al., 2000). It has also been suggested that stiffness index (SI) derived from the DVP can be used as a marker for risk stratification in untreated hypertensive patients (Chen et al., 2005). However, the influence of anti-hypertensive drugs on these arterial stiffness indices by photoplethysmographic method has not yet been studied. Therefore, we conducted a pilot study to explore the relationship between BP and parameters of arterial stiffness on initiating antihypertensive treatment.

## **MATERIALS AND METHODS**

The study was performed at the Department of Physiology, Government Medical College and Hospital, Chandigarh. Newly diagnosed hypertensive patients from medicine outpatient department (OPD) were recruited for the study. Written informed consents were taken from the patients after explaining the nature of the study. Male or female patients between 30 to 40 years were included. Patients with chronic or acute alcohol and/or caffeine intake, smoking, history of cardiovascular disease, diabetes mellitus, asthma, chronic obstructive pulmonary disease (COPD), renal disease or patients on lipid lowering, blood sugar lowering or cardiovascular medications were excluded from the study. Pregnant or lactating females and females using oral contraceptive were also excluded from the study.

The heights of the patients were measured against a wall mounted inelastic measuring tape, with the patient standing erect with feet together. Weight was measured on a weighing scale with the patient in light clothing. The body mass index was calculated using the formula:  $\text{Weight (kg)} / (\text{Height})^2$  (meters). Blood pressure and arterial stiffness were measured in supine posture in the right arm after the patient had rested for 15 min.

### **Measurement of blood pressure**

Blood pressure (BP) was measured over the brachial artery of the right arm by auscultatory method using a conventional mercury sphygmomanometer. Measurements were taken after 15 min of rest in supine posture. Mean arterial pressure (MAP) was calculated using:  $\text{DBP} \pm 1/3$  pulse pressure. Pulse pressure was calculated as:  $\text{systolic pressure} - \text{diastolic pressure}$ .

### **Measurements of arterial stiffness by digital volume pulse analysis**

The digital volume pulse (DVP) analysis method is a noninvasive technique of measuring pulse wave reflections, in order to determine the peripheral arterial stiffness (Millasseau et al., 2006). Arterial stiffness, as measured by the DVP analysis method is a validated reproducible technique, with minimal intra observer variations (Chowienczyk et al., 1999; Sollinger et al., 2006). The stiffness index derived from this method has been demonstrated to have a good correlation with pulse wave velocity (PWV) (Sollinger et al., 2006). The sensitivity and specificity of this technique is comparable to the PWV method in the identification of patients with

latent cardiovascular disease (Millasseau et al., 2002; Woodman et al., 2005).

### **Calculation of the stiffness index (SI) using pulse waveform reflections**

The DVP waveform consists of a systolic peak and a second diastolic peak, which is formed by the reflection of the pulse wave from the small arteries in the lower body. The time delay – that is the peak-to-peak time (PPT) between the systolic and diastolic peaks is related to the transit time of pressure waves from the root of the subclavian artery to the apparent site of reflection and back to the subclavian artery. The degree of pulse wave reflection, which is the stiffness index (SI), depends on the impedance of the microvascular bed and the tone of the small-to-medium-sized blood vessels. This path length can be assumed proportional to height (h). Therefore, the SI can be calculated from the formula:  $\text{SI} = \text{h}/\text{PPT}$  (Oblouck, 1987).

### **Arterial stiffness measurement protocol**

Arterial stiffness measurement of the healthy volunteers as well as patients was performed in the morning between 9 to 10 am following an overnight fast after refraining from caffeine-containing beverages, alcohol, and smoking in the previous 12 h. The DVP was recorded in the person's right index finger. Volunteers rested for 15 min in supine posture in a temperature-controlled environment before the measurements were taken. All the volunteers were advised to refrain from talking and sleeping when the measurements were being taken. Recorded digital pulse waveforms were used (PCA 2; Micro Medical, UK) to generate indices of arterial stiffness using a standard validated protocol (Millasseau et al., 2006). Each person had at least three measurements (recorded for 30 s) taken 1 min apart, and an average was calculated and used for the analysis. Afterward, antihypertensive drug treatment was started; patients were given either an angiotensin II receptor antagonist or calcium channel blocker or thiazide diuretics. BP and arterial stiffness was measured weekly till three weeks in the manner mentioned earlier.

### **Statistical analysis**

Blood pressure (BP) and arterial stiffness parameters in the hypertensive group were analyzed using analysis of variance (ANOVA) with post hoc analysis.

## **RESULTS**

All results were expressed as mean  $\pm$  standard deviation (SD). The total number of hypertensive patients was 14. The anthropometric parameters of newly diagnosed hypertensive patients are given in Table 1. Statistical analysis of the data obtained from the hypertensive group before and after treatment was done. On comparing the BP values before treatment and after each week of initiation of treatment for 3 weeks, a highly significant decline in the systolic BP ( $p < 0.006$ ) and mean BP (0.005) was observed, whereas diastolic BP showed a significant (0.016) decline (Table 2). Multiple

**Table 1.** Anthropometric characteristics of hypertensive patients.

Characteristic	Hypertensive patients (n = 14; mean ± SD)
Males	64.3%
Females	35.7%
Age	42.43 ± 7.89
Height	164.71 ± 7.77
Weight	74.93 ± 5.40
BMI	27.67 ± 5.74

**Table 2.** Pre and post BP treatment and indices of arterial stiffness in the hypertensive patients.

Parameter	Pre treatment (n = 14)	Post treatment			P value
		1 <sup>st</sup> week	2 <sup>nd</sup> week	3 <sup>rd</sup> week	
Systolic BP	159.0 ± 19.10	145.56 ± 7.99	136.75 ± 12.42	135.33 ± 9.24	0.006**
Diastolic BP	104.0 ± 14.86	97.56 ± 6.06	89.00 ± 8.21	87.33 ± 3.06	0.016*
PP	55.0 ± 4.31	48.00 ± 6.56	47.75 ± 7.96	48.00 ± 7.21	0.338
Mean BP	122.33 ± 14.95	113.56 ± 6.02	104.92 ± 9.07	103.33 ± 4.81	0.005**
HR	81.29 ± 13.80	77.11 ± 14.11	77.13 ± 13.87	75.33 ± 11.85	0.826
Stiffness index	9.56 ± 1.78	9.25 ± 2.08	8.32 ± 2.15	9.08 ± 1.76	0.641
Reflection index	68.30 ± 9.27	66.25 ± 15.85	65.29 ± 13.19	63.00 ± 15.59	0.924
Peak to peak time	176.70 ± 38.56	187.75 ± 38.87	208.71 ± 45.76	190.33 ± 7.39	0.459

\* Significant; \*\* highly significant.

comparisons on post hoc analysis revealed that the SBP and DBP showed a significant decline ( $p = 0.011$  and  $0.027$ , respectively) at the second visit, which is around two weeks post treatment and mean BP shows a highly significant decrease ( $p = 0.009$ ) at this time. However, the pulse pressure and heart rate did not change significantly with treatment.

Representative pulse wave tracings as recorded in a hypertensive patient before the beginning of antihypertensive treatment (Figure 1) and at the end of three weeks of treatment (Figure 2) are shown. From these tracings also, not much difference in the pulse waveform (and thereby arterial stiffness) appears. Arterial stiffness was measurable in only 10 hypertensive patients. In the other 4 patients, on applying the probe, the message “stiff” was displayed on the screen. This occurs when the large arteries are very stiff so that the direct and reflected wave merges together, making it impossible to distinguish them. No diastolic inflection point can be found and the message “stiff” is displayed.

Furthermore, the pre treatment and post treatment peak to peak time (PPT) at two weeks shows an increase but it is not statistically significant. Other parameters such as SI and RI did not change significantly with treatment for the same duration. Pearson’s correlation and p value for different BP and arterial stiffness variables showed that there was a significant positive correlation between RI and SI (0.470) and a significant negative correlation

between RI and PPT (-0.428). SI and PPT were highly significantly negatively correlated (-0.950). Pulse pressure was also significantly correlated with both SI (0.384) and PPT (-0.447), while HR significantly correlated with both SI (0.470) and PPT (-0.428).

## DISCUSSION

The relationship between pulse wave velocity (PWV) and blood pressure showed that higher pressure will result in increased PWV as found by Young (1809). For this reason, it would be expected that drug interventions that decrease blood pressure would be associated with a fall in PWV. This has been demonstrated with a range of antihypertensive drugs. However, in these studies, the encounter interval between the doctor and the patient after initiating treatment was > 1 month. In this study, we followed the patients at weekly intervals after initiating antihypertensive treatment in order to determine the relationship between normalization of BP and arterial stiffness. In the hypertensive group, it was seen that by two weeks of treatment the SBP, DBP and mean BP of the patients showed a statistically significant decline and by the third week of treatment the blood pressure showed no further decline. However, the arterial stiffness parameters showed no change in the entire 3 weeks duration of treatment.

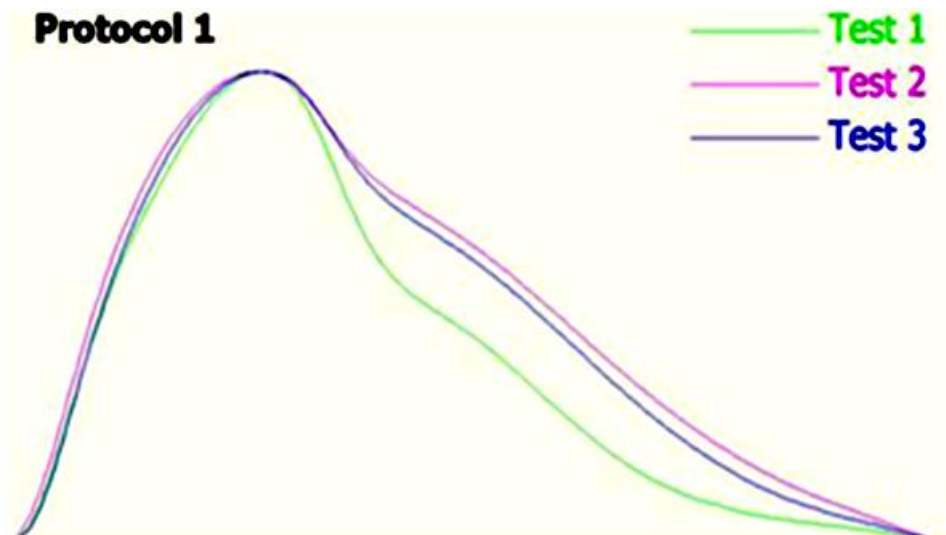


Figure 1. Pulse wave form of hypertensive patient before treatment.

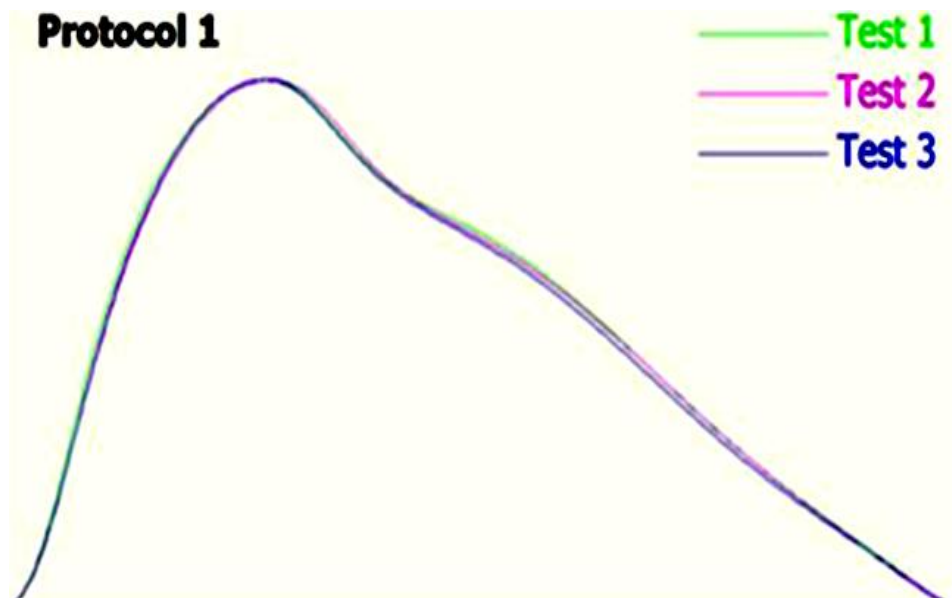


Figure 2. Pulse wave form of same patient after the third week of treatment.

The currently recommended encounter interval after initiating treatment in hypertensive patients is 1 month (Jones and Hall, 2004) and this is based largely on expert opinion. However, in a study by Turchin et al. (2010), the difference in time to blood pressure normalization persisted at encounter intervals shorter than the currently recommended. In this study, it was found that in patients with an average encounter interval  $\leq 2$  weeks BP normalized after a median of 0.7 months. This was also seen in our study. For an encounter interval of 1 to 2 weeks, the rates of decrease for systolic and diastolic

blood pressures were 43.8 and 13.1 mm Hg/month, respectively (Turchin et al., 2010). From recent research, it is evident that shorter encounter intervals causes faster BP reduction; therefore, if shorter encounter intervals are to be achieved, more creative approaches to patient care are needed (Okie, 2008).

We also observed that although BP normalized in our patient by the end of third week of initiating the treatment, yet there was no alteration in the parameters of arterial stiffness at this time. This indicates that despite mean BP being a major contributor to arterial stiffness, its reduction

after initiation of antihypertensive therapy does not go hand in hand with parameters of arterial stiffness. Probably arterial stiffness takes a longer time to decrease as compared to blood pressure. Physiologically, the stiffness of the large arteries depends on 3 main factors: structural elements within the arterial wall, such as elastin and collagen; distending pressure and vascular smooth muscle tone (McEniery et al., 2006). In single dose or short-term studies, angiotensin-converting enzyme inhibitors (ACEIs), angiotensin receptor blockers (ARBs), calcium channel blockers (CCBs), selective beta1-blockers, beta-blockers with vasodilating properties and some diuretics could improve arterial stiffness (Blacher et al., 2005; Van Bortel et al., 1995). However, it is not clear whether this effect was limited to the decrease in blood pressure, or whether also an effect beyond the effect of blood pressure reduction was present.

After a 6-month treatment period for a similar reduction in blood pressure, the ACEI perindopril showed a more pronounced improvement of carotid artery stiffness than the diuretic amiloride/hydrochlorothiazide (Kool et al., 1995), showing that the de-stiffening potency differs between antihypertensive drugs and suggesting that some may have an effect beyond the effect due to blood pressure decrease. Moreover, a meta-analysis by Ong et al. (2011) revealed that in short-term studies (defined by the authors as a duration <4 weeks), only ACEIs reduced PWV beyond the blood pressure effect, whereas in long-term studies (4 weeks or more), all studied drug classes were effective. Vasodilation may at least in part account for the effect beyond blood pressure reduction of vasoactive drugs such as ACEI, ARB, CCB and beta-blockers with vasodilating properties. However, the mechanisms by which diuretics and selective beta1-blockers would reduce stiffness beyond blood pressure values are unknown. It was also observed that the effect for selective beta1-blockers and diuretics on PWV was comparable to the vasoactive drug classes (Ong et al., 2011). This may suggest that apart from the antihypertensive property of the antihypertensive drug, the sustained unloading of the arteries by blood pressure reduction itself may contribute to structural de-stiffening of arteries within a few months.

Since several mechanisms may be involved in producing reductions in arterial stiffness with a given treatment, assessment of arterial stiffness has to be distinguished between the effects of acute, short-term, or long-term chronic treatments. For example, after acute administration of an antihypertensive drug, improvement of arterial stiffness is principally related to functional or mechanical mechanisms such as reduction of distension pressure, reduction of smooth muscle tone, enhancement of endothelial functions, whereas after long-term chronic treatment, additional mechanisms can be involved; for example changes in the arterial geometry and structure, reduction in degree of fibrosis, increase in elastin/

collagen ratio, remodeling of the arterial wall (Laurent et al., 2006). Experts agree that assessment of arterial stiffness after a long-term treatment period should be preferred because of the underlying patho-physiological mechanisms involved and because acute effects may not predict long term efficacy (Bortela et al., 2011).

## Conclusion

From this pilot study, it was concluded that reduction in BP in hypertensive patients as measured clinically by brachial cuff sphygmomanometry seemed to be dependent on the encounter interval. The decrease in blood pressure in hypertensive patients occurred earlier within three weeks as compared to the changes in arterial stiffness, which did not occur even till three weeks of initiating the treatment.

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*Full Length Research Paper*

# Investigation of influence of inside out transobturator vaginal tape (TVT-O) procedure on objective, subjective cure rates and different quality of life tests in stress urinary incontinence treatment

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This study was aimed at investigating the influence of the transobturator tape (TOT) procedure used in surgical treatment of stress urinary incontinence on objective and subjective cure rates, as well as quality of life. A total of 156 patients who were diagnosed as stress incontinence and mixed incontinence with stress predominancy, underwent a TOT operation under spinal anesthesia by one surgeon or two surgeons of the team. Transobturator vaginal tape (TVT)-obturator inside out material (TVT-O® (Gynecare) was used in the operation. All patients underwent preoperative and postoperative urodynamic tests and pad tests, and the results were compared. The objective and subjective cure rates were investigated in mean of 30.3 months of follow-up. The objective cure was evaluated with negative cough test and less than 8 g 24-h pad test, while the subjective cure was evaluated with Patient Global Impression of Improvement (PGI). All patients were given IIQ-7, UDI-6, UISS and VAS tests at least once and the influence of the operation upon quality of life was investigated. According to the result obtained, the mean follow up time was  $30.3 \pm 7.4$  months (range 17 - 42). The objective cure rate was found to be 84.6% (132 patients), the subjective cure rate was found to be 89% (139 patients) and the failure rate was found to be 10.8% (17 patients). Preoperative and postoperative pad test results of the patients were found to be statistically significant ( $38 \pm 22.3$  vs.  $1 \pm 2.6$   $p < 0.05$ ). Among urodynamics and symptoms evaluated pre- and postoperatively, a statistically significant difference was detected between the Q tip test (43.60 vs. 20.8), leaks over 24 h (4 vs. 0), daytime frequency/nocturia (0.95 vs. 0.58) and maximum urethral closure pressure (57.3 vs. 35) ( $p < 0.05$ ). The preoperative and postoperative incontinence impact questionnaire-short form (IIQ-7) (11 vs. 0.6), urogenital distress inventory-short form (UDI-6) (14 vs. 7), urinary incontinence severity score (UISS) (11 vs. 2.8) and the visual analogue scale (VAS) (68 vs. 8) quality of life tests showed a significant difference ( $p < 0.05$ ). Summarily, the objective and subjective cure rates of the TOT procedure in the surgical treatment of female stress incontinence were quite high, thus it is an effective technique. The influence of this operation on quality of life scores evaluated with various parameters is satisfying.

**Key words:** Transobturator tape (TOT), objective and subjective cure rates, urinary incontinence.

## INTRODUCTION

Since the first reports from the Ulmsten group, Tension-

free Vaginal Tape (TVT®, Gynecare), the first polypropylene mid-urethral sling put on the market, has become one of the most commonly performed procedures worldwide due to the ease of performance and high success rates. And to date, several hundred thousand TVT procedures have been performed.

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**Table 1.** Preoperative and postoperative urodynamic evaluations of patients.

Urodynamic evaluation	Preoperatif	Postoperatif
Q-tip test (°)	43.60 ± 20.4	20.8 ± 14.9*
First desire to void (ml)	185 ± 78.3	209.8 ± 45.2
Maximum detrusor pressure (cm H <sub>2</sub> O)	17.48 ± 6.03	20.2 ± 3.6
ALPP (cm H <sub>2</sub> O)	80.80 ± 25.57	75.1 ± 19.63
Cystometric capacity (ml)	496.80 ± 65.63	488 ± 75.8
Compliance (ml/cm H <sub>2</sub> O)	58.61 ± 20.83	60.13 ± 25.72
Residual urine (ml)	13.2 ± 8.9	14.8 ± 18.5
Maximum urethral closure pressure	57.3 ± 9.4	35 ± 7.3*
Leaks over 24 hours	(1 - 6)	0*
Peak flow	25.8 ± 7.1	28.4 ± 6.4
Daytime frequency/nocturia	0.95 ± 1.46	0.58 ± 0.62*

ALPP: Abdominal leak- point pressure; \*statistically significant difference p<00.5.

Moreover, several devices have been introduced onto the market to ensure that mid-urethral sling procedures are now even less invasive, including the Suprapubic Arc (SPARC™ Sling System [American Medical Systems UK Ltd, Brentford, UK]) sling, the intravaginal (IVS) sling, transobturator slings, pre-pubic TVT and, more recently, the so-called mini-slings (the TVT-Secur and Mini-Arc slings).

The choice of the best surgical approach for each patient with stress urinary incontinence depends on several issues, including the patient's age, expectations and co-morbidity, previous reconstructive procedures, symptom severity, risk of intraoperative and postoperative complications, recovery time and long-term success rate. The transobturator tape (TOT) procedure has been recently developed as a new minimally invasive sling procedure. It is thought to have the benefits of easy performance and decreased risk of bladder and visceral injury. Two types of TOT have been performed, the inside-out (TVT-O) and the outside-in transobturator tape (TOT) approaches with the choice of the surgical approach predominantly driven by the surgeon's preference. This study was aimed at Investigating of the influence of the transobturator tape (TOT) procedure used in surgical treatment of stress urinary incontinence on objective and subjective cure rates, as well as quality of life.

## MATERIALS AND METHODS

A total of 156 patients with stress incontinence who were admitted to the Gynecology and Obstetrics Clinics of Taksim Research and Training Hospital and Şirnak İlil State Hospital between May 2005 and January 2010 were included in this retrospective study. A detailed anamnesis, including duration and severity of stress incontinence was obtained from the patients. All patients had experienced these symptoms for more than 4 years. Symptoms were found to be grade 2 (grade 1-3) according to Ingelman-Sundberg scale. All patients underwent vaginal examination and transvaginal ultrasonography. All menopausal patients were

administered a local estrogen treatment (estriol vaginal cream, Assos pharmaceuticals). For urogynecologic evaluation, a stress test was applied in standing and lying positions after the urinary bladder had been expanded with 300 ml isotonic solution. In addition, 24 and 48 h pad follow ups were performed.

Urodynamic tests such as cystometry were used in all patients for the discrimination of stress and urge urinary incontinence. Urodynamic evaluation as shown in Table 1, was done using Laborie and Medical Measurement System (MMS) urodynamic devices. A sterile 8 French dual channel cystometry catheter was placed into the urethra and a rectal catheter with 5 ml balloon was placed into the rectum when the patient was in lithotomy position. Cystometric assessment was done after residual urine measurement had been performed. The urinary bladder was filled with saline solution at room temperature at the rate of 50 ml/min and the patient was asked to cough after each 100 ml filling. Urinary incontinence occurring in this time was detected and the diagnosis of stress incontinence was made. Urodynamic diagnosis of detrusor instability (urge incontinence) was made upon detection of an elevation 15 cm H<sub>2</sub>O or above in basal detrusor pressure in cystometry. All patients were administered 2 g parenteral cefazolin preoperatively for antibacterial prophylaxis. While the patients who would undergo only TOT did not have vaginal lavage applied, this procedure was applied preoperatively to the patients who would undergo additional surgery (cystocele). The TOT procedure was performed as described by Leval. Patients who were applied general or local anesthesia, who underwent vaginal surgery except anterior repair, who desired to have a baby, and who had severe systemic diseases or mixed urinary incontinence with urge incontinence predominancy were excluded from the study. All patients were administered with regional (spinal) anesthesia.

Cystoscopy was performed to evaluate the bladder and urethra after the procedure. Patients who would undergo cystocele operation had the additional intervention performed after the prolene band had been placed. Afterwards, a stress test was applied, the band level was adjusted and the operation was terminated. The duration of TOT, cystoscopy and any additional operations, if performed, were recorded. All patients were monitored with the Foley catheter for bladder drainage for 24 h. The catheter was removed if residual volume was below 100 ml at the end of 24 h and intermittent catheterization was performed if post-voiding residual volume was above 100 ml. Similar protocols were applied for pre, peri and post-operative assessments in both clinics. All surgical procedures were performed by one or two members of the surgical team. Postoperative controls were done at 2, 6, 12, 24 and 48 months. The objective cure was evaluated with a negative



cough test and a 24-h pad test's being less than 8 g; the subjective cure was evaluated with Patient Global Impression of Improvement (PGI).

The influence of TOT on quality of life of the patients was evaluated with the Incontinence Impact Questionnaire-Short Form (IIQ-7), urogenital distress inventory-short form (UDI-6), urinary incontinence severity score (UISS) and the visual analogue scale (VAS), tested pre- and postoperatively. The last studied objective, subjective cure rates and quality of life scores were used in the study. Assessments done within the first postoperative 2 months could be applied to all patients. So those first assessments were taken essentially in the patients who were last to be followed up on. Statistical analyses were done using the Statistical Package for Social Science (SPSS Inc, Chicago, Illinois, USA) 15.0 program. Constant data were given as mean  $\pm$  standard deviation (SD) and analyzed with the Wilcoxon's signed rank test for statistical significance. Categorical data were given as numerical values and in percentages. A p level  $<0.05$  was accepted as statistically significant.

## RESULTS

The mean duration of follow up was  $30.3 \pm 7.4$  (range 17 - 42) years. The mean age of the patients was found as  $48.43 \pm 6.24$  years (range 42 - 68). The mean parity of the patients was  $5.24 \pm 2.86$  (min 2 – max 13) and the mean body mass index was found to be  $23.7 \pm 4.8$  (Table 2).

## DISCUSSION

Urinary incontinence (UI) is a prevalent condition that affects approximately 27% of women worldwide, with far-reaching physical, psychological, social, and economic implications. Incontinence has been found to reduce health-related quality of life to roughly the same degree as chronic conditions such as depression and Type I diabetes (Milsom, 2009; Stach-Lempinen et al., 2004). Personal consequences include restriction of physical and social activity, self-imposed social isolation and sexual dysfunction (Oh et al., 2008). The transobturator tape (TOT) procedure has recently been developed as a new minimally invasive sling procedure. It is thought to have the benefits of easy performance and decreased risk of bladder and visceral injury (Ward and Hilton, 2004). Spinosa and Dubuis (2005) followed up 117 patients who underwent TOT for 16.3 months, and the complete and partial subjective cure rates were found as 92.3% (n:108) and 4.2% (n:5), respectively. Overall, four patients stated that their condition did not change. In another study that 120 patients were followed up for one year, 80% patients reported that they were completely dry and 12% reported that they had recovered almost totally. Globally, 78% patients reported that their incontinence improved well during daily activities, exertion and sexual intercourse (Roumeguère et al., 2005). Waltregny et al. (2006) found complete cure rate of 91% after TVT-O procedure on one-year follow up. A significant improvement was also detected in the quality

**Table 2.** Diagnosis and distribution of the patients.

Data	Total number of patient
Stress Incontinence	100 (64.1%)
Mixed Incontinence	56 (35.9%)
Previous incontinence surgery	20 (12.8%)

The mean operative time was found to be  $13.8 \pm 5.16$  min in patients who underwent only TOT and TOT-anterior repair.

of life and severity of incontinence in most patients. In another study with a mean of 4 months follow up, the objective and subjective cure rates were found to be 92 and 97%, respectively. An improvement was observed in the quality of life of 96% patients (Cindolo et al., 2004). In an additional study including 94 patients with a mean of 12.8 months of follow up, the cure rate was found to be 95% (Mellier et al., 2004).

In our study including 156 patients with a mean follow up time of 30.3 months, the objective and subjective cure rates were found to be 84 and 89%, respectively (Table 3). The objective and subjective cure rates seem lower than the aforementioned studies. We considered that this is due to the follow-up period. Cure rates decline as the duration of follow up increases. In parallel with this, Giberti et al. (2007) reported an 80% cure rate with 2 years of follow up, while Waltregny et al. (2008) reported an 88% cure rate with a 3 year follow up period. Clues were obtained about mid-term outcomes of this procedure with an 82.4% cure rate with 4 years of follow up with a group of 74 patients who underwent TVT-O (Liapis et al., 2010). The fact that 35.9% of the patients in our study group had mixed incontinence without detrusor overactivity may have affected success rates. Holmgren et al. (2005) detected low cure rates in patients with mixed urinary incontinence. The success rate of 60% in 4 years was seen to decline to 30% in 4-8 years. However, the success rate of pure stress urinary incontinence is 82% in this study (Holmgren et al., 2005). Paick et al. (2007) did not detect a statistically significant difference between pure and mixed stress urinary incontinence in terms of cure rates. In a review, it was stated that mixed urinary incontinence could be successfully treated with mid-urethral slings; however, persistent urge symptoms could severely affect the quality of life for the patients (Fong and Nitti, 2010). Similar to our study, in a study also including the effect of the operation done after TOT procedures, a significant difference was detected between preoperative and postoperative assessment scores. In this study, a significant improvement was seen in UISS, DIS, VAS, IIQ-7, UDI-6 scores tested preoperatively and 2 months postoperatively (Table 4). In our study, all quality of life tests except DIS were used and similar results were obtained (Laurikainen et al., 2007). Shalom et al. (2011) stated that mid-urethral sling placement via suprapubic route provided better quality of life scores compared to transvaginal route in female

**Table 3.** Objective, subjective cure rates and failure in patients who underwent TOT.

Data	Total number of patient (%)
Objective cure rate	132 (84.6)
Subjective cure rate	139 (89.1)
Failure	17 (10.8)

Preoperative and postoperative pad test results of the patients were found to be statistically significant ( $38 \pm 22.3$  vs.  $1 \pm 2.6$  g;  $p=0.021$   $p<00.5$ ).

**Table 4.** Preoperative and postoperative quality of life tests of the patients.

Quality of life test	Preoperative	Postoperative
UISS	$11 \pm 4$	$2.8 \pm 1^*$
VAS	$68 \pm 24$	$8 \pm 2^*$
IIQ-7	$16 \pm 4$	$6 \pm 3^*$
UDI-6	$14 \pm 3$	$7 \pm 2^*$

UISS: Urinary incontinence severity score; VAS: visual analogue scale; IIQ-7: incontinence impact questionnaire-short form; UDI-6: urogenital distress inventory- short form. \*Statistically significant difference  $P<00.5$ .

stress urinary incontinence. While there was not a difference between preoperative UDI-6 scores in both groups, lower UDI-6 scores were found in postoperative suprapubic group.

In our study, when the high length of follow-up periods and the existence of mix incontinence and recurrent incontinence cases are considered, the objective and subjective cure ratios were found to be high compared to similar studies in the literature. Also, in all life quality scores evaluated by 4 different tests, a statistically significant improvement was seen after TOT operation.

## Conclusion

The objective and subjective cure rates of TOT procedure in surgical treatment of female stress incontinence are quite high, thus it is an effective technique. In addition, the influence of this operation on quality of life scores evaluated within the various parameters is also satisfying.

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## ***UPCOMING CONFERENCES***

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