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# Cannulated intravaginal injection technique (CIVIT) A Novel Vaginal Injection Technique

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**Non-surgical procedures such as fillers, PRP and derivatives, energy-based devices and adipose derivate mesenchymal stem cell treatments are begun to be used in women genital area for both functional and aesthetic purposes. After theproduction of injectable HA for genital use, patients were able to benefit more effectively from these applications and its use in the vagina became more common. In our study, we aimed to demonstrate a new intravaginal injection technique, Cannulated Intravaginal Injection Technique (CIVIT) that we can perform vaginal injection more homogenously and less traumatic and more effectively to the entire vaginal mucosa. Retrospectively, the data of 44 patients who underwent intravaginal injection of HA manufactured for genital use at a private Female Health Clinic were analyzed. Of the 44 patients, 21 were injected using the random needling technique, and 22 were injected using CIVIT. All patients had symptoms of genitourinary syndrome (GUS), a vaginal health index below 15, and were compared based on the Female Sexual Function Index (FSFI) and visual analogue scale (VAS) for GUS before and after the procedures. It was observed that all post-injection values, except for FSFI arousal ($p = 0.539$), were statistically significantly higher in the CIVIT group ($P = 0.001$). Post injection dryness, dyspareunia and discomfort values decreased significantly in the CIVIT group compared to the Random Needling group. Our new technique, CIVIT, and random injection, which is a frequently used technique, are two effective techniques for vaginal rejuvenation. However, CIVIT is significantly more effective than the random technique in improving genitourinary symptoms, vaginal health index and sexual function.**

**Keywords** Genitourinary syndrome, Vaginal health, Intravaginal injection, Female sexual function

In last decade, if possible, non-surgical ways to treat some diseases or to provide a wellbeing are begun to prefer by both physicians and the patients. Non-surgical procedures such as; fillers, PRP and derivates, energy-based devices, adipose derivate mesenchymal stem cell treatments are begun to use in women genital area for functional and aesthetic goals as well. Nowadays, hyaluronic acid (HA) based materials which are manufactured and certified for genital use are also commonly used for regeneration and volumizing in female genitalia.

Recent uses of HA for vaginal regeneration in the treatment of Genito Urinary Syndrome of Menopause were topical[1–5]. However, after the genital injectable HA was produced, patients were able to benefit from the applications more effectively and it was begun to use in the vagina more common[6–8]. But most of these injections are mostly done as random needle puncture in the studies due to ease of personal experience. However, the effectiveness of the product used decreases due to the fact that the product used remains and distributes non-homogenously unstable under the mucosa and overflows back through the holes opened.

In our study, we aimed to demonstrate that we can perform vaginal injection more homogenously and less traumatic and more effectively to the entire vaginal mucosa by using a new intravaginal injection technique, Cannulated Intravaginal Injection Technique (CIVIT).

## Material and method

We retrospectively analysed the routine examination data of 44 patients who underwent intravaginal injection of HA manufactured for genital use in private Female Health Clinic. 21 of 44 were injected by random needling and 23 were injected with CIVIT under local anaesthesia. The patients included in our study were postmenopausal patients aged 45–65 years whose Vaginal Health Index (VHI)[9] was below 15 with symptoms of genitourinary syndrome (GUS) as genital dryness, burning, and irritation; sexual symptoms such as lack of lubrication,

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discomfort, pain, and impaired function; and urinary symptoms of urgency, dysuria, and recurrent urinary tract infections. Exclusion criteria were use of local or systemic hormone replacement therapy, vaginal infection, previous vaginal surgery and history of gynaecological cancer. Vaginal health index (VHI), female sexual function index (FSFI)[10] and visual analogue scale (VAS) for GUS symptoms were used before and 6 weeks after injection in all patients. VHI score was assessed including: vaginal overall elasticity, vaginal fluid volume, vaginal pH, epithelial integrity and vaginal moisture. Each assessed on scales ranging from 1 (none) to 5 (excellent) with a total score of 25 (cut- off for vaginal atrophy is 15). Turkish validated form of FSFI was used for all patients to asses sexual function. The FSFI includes 19 questions and provides assessment of 6 sub-scores. A total FSFI score lower than 26.55 is the cut-off value used to diagnose sexual dysfunction. VAS for GUS was used as 4-point scale which included as 0 = none, 1 = mild, 2 = moderate and 3 = severe for each symptom (dryness, dyspareunia, itching, fire, discomfort).

## Technique

Random Needling technique was performed by providing multiple needle insertions randomly and blindly into the entire vagina to 40 different points and HA was administered under the mucosa.

For CIVIT, HA was injected as drops at 40 different points on the entire vaginal wall using 8 different entry points (Figs. 1 and 2). First, the vaginal tissue was punctured with a 23G guide needle, 4 on the left vaginal wall and 4 on the right vaginal wall, and a 25G x 38 mm blunt cannula of approximately 5 cm was inserted along the vaginal longitudinal axis through the same hole. After safety aspiration, 0.05 ml ARMONIA was injected with

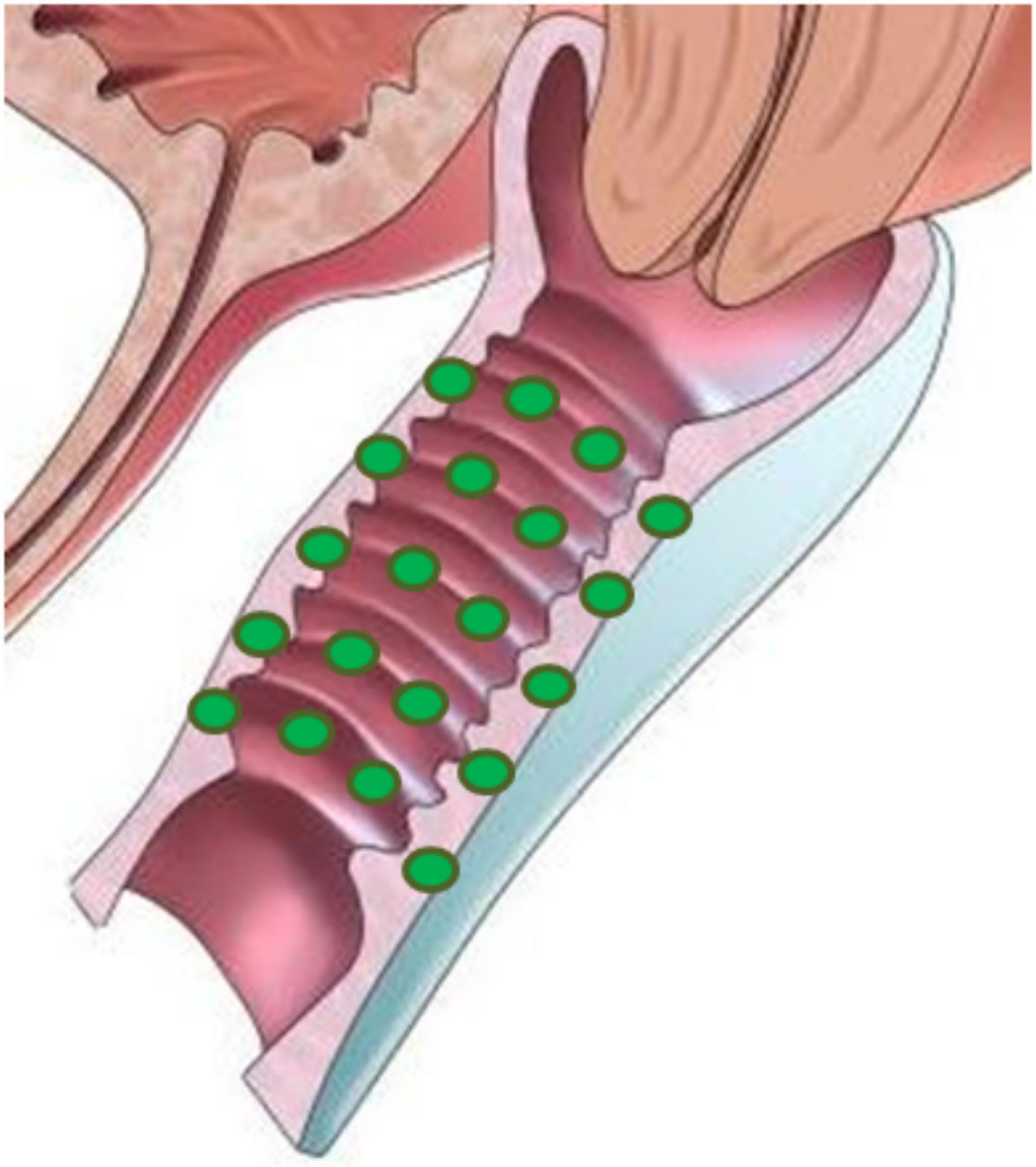

**Fig. 1**. Injection points of cannulated intravaginal injection technique.

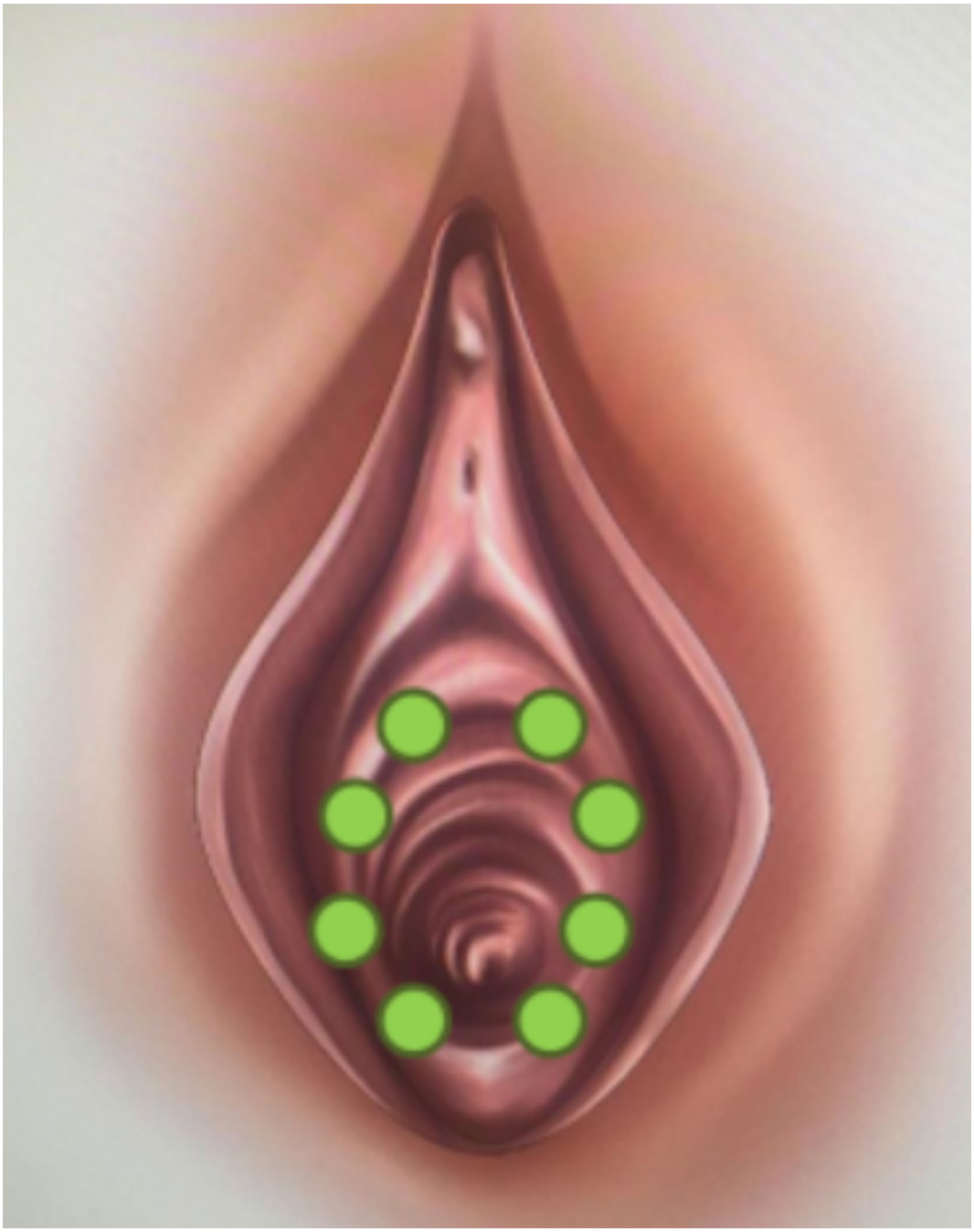

**Fig. 2**. Entry points of cannulated intravaginal injection technique.

linear retrograde method at 1 cm intervals along the line. This procedure was repeated for all 8 points which were homogeneously located in the introitus vagina.

## Statistical analysis

Descriptive values of the data obtained were calculated as mean ± standard deviation, median [IQR] and number (%). The conformity of the data to normal distribution according to the groups was evaluated by Shapiro Wilk test. Changes in numerical characteristics were analysed by Mann Whitney-U test for those that did not show normal distribution for the two groups. Categorical data were analysed by Pearson Chi-square test for both groups. The difference of VAS scores before and after the procedure for both treatment groups was taken and the differences were analysed for both groups. Repeated measure ANOVA test was used to investigate the changes in numerical repeated data in terms of both groups together with their interactions. In addition, multiple comparisons of scores with significant interactions according to groups and time were analysed by Bonferonni corrected test. The statistical significance criterion was taken as $P < 0.05$. Statistical evaluation of the obtained data was performed with IBM SPSS Statistics 22 (IBM SPSS, Turkey) programme.

## Results

Differences between continuous variables according to Random and CIVIT groups were shown in the Table 1. In addition, it was observed that all postinjection values except for FSFI arousal ($p = 0.539$), were statistically significantly higher in the CIVIT group ($P = 0.001$).

According to the Table 2 which analysed the distribution of the subgroups of GUS VAS values according to both groups. it was found that there was a statistically significant difference in terms of postinjection dryness, dyspareunia and discomfort ($p = 0.001$, 0.005 and 0.001, respectively). It was observed that postinjection dryness, dyspareunia and discomfort values decreased significantly in the CIVIT group compared to the Random Needling group.

In addition, when the patients' recommendation of these two treatment groups was analysed, it was determined that all of the CIVIT group patients recommended these two treatment groups at a significant level (0.044).

The Table 3 in which the differences between pre and postinjection VAS scores of the GUS subgroups were taken and analysed in terms of both groups. Accordingly, it was found that the changes in itching, discomfort and total VAS scores were significantly lower in the CIVIT group ($p = 0.046$, 0.008 and 0.007, respectively).

When we analysed the relationship between repeated measurements of FSFI scores according to treatment groups, the time, group, group-time interactions were found as follows as Table 4. According to this table, significant differences were found between before and after scores of all scores. In addition, it was calculated that all scores had statistically significant differences both according to time and according to both groups. However, it was observed that VHI, arousal, lubrication, orgasm and pain scores did not differ according to which group the patients were in. However, other desire, satisfaction and total scores were also found to differ significantly according to the groups ($p = 0.007$, 0.009 and 0.001, respectively).

The results of the multicomparison analysis for all scores for which significant group and time interactions were observed above are shown in the table below. According to Table 5, it was found that there was a significant increase in each score after treatment in both random and CIVIT groups.

## Discussion

In our study, CIVIT, a new technique for vaginal HA injection, was found to be significantly more effective in improving genitourinary symptoms, vaginal health index and FSFI scores compared to the random needling technique. CIVIT made a significant change in the genitourinary symptoms of dryness, dyspareunia and discomfort. In particular, it led to a significant reduction in itching and discomfort symptoms.

Homogeneous distribution of the product to the vaginal mucosa during CIVIT application, less traumatic because it creates less holes and the absence of holes that will decrease the product to escape from the mucosa increase the effectiveness of HA and similar products used. In a study comparing cannula and needle applications, it is stated that there is less pain, oedema and bruising in the use of cannula compared to the needle. In addition, the product can be administered to a large area and atraumatically with a single incision[11].

In addition, another advantage of CIVIT compared to random application is the chance to distribute the product homogenously over the entire vaginal mucosa. In a study comparing the application techniques of

| | Random needling ($N = 21$) | | | CIVIT ($n = 23$) | | | |
|---|---|---|---|---|---|---|---|
| | Mean | Median | Standart deviation | Mean | Median | Standart deviation | *p* |
| Age | 50.57 | 51.00 | 4.61 | 51.52 | 51.00 | 4.86 | 0 .654 |
| GUS VAS preinjection | 6.10 | 5.00 | 3.14 | 5.96 | 5.00 | 3.17 | 0.868 |
| GUS VAS postinjection | 2.62 | 2.00 | 1.66 | 0.43 | 0.00 | 0.84 | **0.001** |
| VHI preinjection | 10.81 | 10.00 | 1.99 | 10.09 | 9.00 | 1.95 | 0.180 |
| VHI postinjection | 15.67 | 16.00 | 1.74 | 18.17 | 19.00 | 2.77 | **0.001** |
| FSFI desire preinjection | 3.24 | 3.20 | 0.56 | 3.18 | 3.00 | 0.64 | 0.640 |
| FSFI desire postinjection | 3.69 | 3.80 | 0.62 | 4.62 | 4.80 | 0.46 | **0.001** |
| FSFI arousal preinjection | 2.94 | 2.90 | 0.53 | 2.74 | 2.70 | 0.70 | 0.101 |
| FSFI arousal postinjection | 3.38 | 3.40 | 0.49 | 3.58 | 3.30 | 0.72 | 0.539 |
| FSFI lumbrication preinjection | 2.25 | 2.20 | 0.67 | 1.88 | 1.50 | 0.82 | **0.032** |
| FSFI Lumbrication Postinjection | 2.87 | 2.80 | 0.73 | 3.60 | 3.30 | 0.89 | **0.003** |
| FSFI orgasm preinjection | 2.94 | 2.80 | 0.83 | 3.01 | 3.60 | 1.09 | 0.696 |
| FSFI orgasm postinjection | 3.54 | 3.40 | 0.75 | 4.33 | 4.80 | 1.02 | **0.001** |
| FSFI satisfaction preinjection | 2.88 | 2.80 | 0.68 | 3.07 | 3.60 | 0.87 | 0.291 |
| FSFI satisfaction postinjection | 3.47 | 3.70 | 0.71 | 4.40 | 4.40 | 0.66 | **0.001** |
| FSFI pain preinjection | 1.96 | 1.90 | 0.50 | 1.69 | 1.60 | 0.48 | **0.044** |
| FSFI pain postinjection | 2.88 | 3.00 | 0.62 | 3.67 | 3.60 | 0.80 | **0.001** |
| FSFI total preinjection | 16.21 | 15.90 | 1.77 | 15.68 | 15.10 | 1.66 | 0.249 |
| FSFI total preinjection | 19.82 | 19.70 | 2.10 | 24.20 | 23.90 | 2.33 | **0.001** |

**Table 1**. Differences Between Random and CIVIT Groups. Significant values are in bold.

| | | Random needling | | CIVIT | | p |
|---|---|---|---|---|---|---|
| | | Frequency | Percent | Frequency | Percent | |
| Dryness preinjection | 1 | 8 | 38.1 | 2 | 8.7 | 0.296 |
| | 2 | 8 | 38.1 | 10 | 43.5 | |
| | 3 | 5 | 23.8 | 5 | 21.7 | |
| Dryness postinjection | 0 | 5 | 23.8 | 21 | 91.3 | **0.001** |
| | 1 | 15 | 71.4 | 2 | 8.7 | |
| | 2 | 1 | 4.8 | 0 | 0.0 | |
| Dyspareunia preinjection | 0 | 4 | 19.0 | 6 | 26.1 | 0.824 |
| | 1 | 8 | 38.1 | 9 | 39.1 | |
| | 2 | 7 | 33.3 | 5 | 21.7 | |
| | 3 | 2 | 9.5 | 3 | 13.0 | |
| Dyspareunia postinjection | 0 | 8 | 38.1 | 19 | 82.6 | **0.005** |
| | 1 | 13 | 61.9 | 4 | 17.4 | |
| Itching preinjection | 0 | 8 | 38.1 | 5 | 21.7 | 0.362 |
| | 1 | 10 | 47.6 | 15 | 65.2 | |
| | 2 | 3 | 14.3 | 2 | 8.7 | |
| | 3 | 0 | 0.0 | 1 | 4.3 | |
| Itching postinjection | 0 | 16 | 76.2 | 22 | 95.7 | 0.088 |
| | 1 | 5 | 23.8 | 1 | 4.3 | |
| Fire preinjection | 0 | 10 | 47.6 | 7 | 30.4 | 0.485 |
| | 1 | 10 | 47.6 | 15 | 65.2 | |
| | 2 | 1 | 4.8 | 1 | 4.3 | |
| Fire postinjection | 0 | 20 | 95.2 | 22 | 95.7 | 0.999 |
| | 1 | 1 | 4.8 | 1 | 4.3 | |
| Discomfort preinjection | 0 | 1 | 4.8 | 2 | 8.7 | 0.916 |
| | 1 | 12 | 57.1 | 14 | 60.9 | |
| | 2 | 3 | 14.3 | 3 | 13.0 | |
| | 3 | 5 | 23.8 | 4 | 17.4 | |
| Discomfort postinjection | 0 | 6 | 28.6 | 21 | 91.3 | **0.001** |
| | 1 | 12 | 57.1 | 2 | 8.7 | |
| | 2 | 2 | 9.5 | 0 | 0.0 | |
| | 3 | 1 | 4.8 | 0 | 0.0 | |
| Do you recommed? | No | 4 | 19.0 | 0 | 0.0 | **0.044** |
| | Yes | 17 | 81.0 | 23 | 100.0 | |

**Table 2**. Analysis of the Subgroups of GUS VAS Values Between Both Groups. Significant values are in bold.

| | Random needling ($N=21$) | | | CIVIT ($n=23$) | | | |
|---|---|---|---|---|---|---|---|
| | Mean | Median | Standart deviation | Mean | Median | Standart deviation | *p* |
| Dryness | -1.05 | -1.00 | 0.67 | -1.57 | -1.00 | 0.90 | 0.053 |
| Dyspareunia | -0.71 | -1.00 | 0.64 | -1.04 | -1.00 | 0.77 | 0.143 |
| Itching | -0.52 | -1.00 | 0.51 | -0.91 | -1.00 | 0.79 | **0.046** |
| Fire | -0.52 | -1.00 | 0.51 | -0.70 | -1.00 | 0.47 | 0.248 |
| Discomfort | -0.67 | -1.00 | 0.73 | -1.30 | -1.00 | 0.76 | **0.008** |
| Total VAS | -3.48 | -4.00 | 1.89 | -5.52 | -5.00 | 2.52 | **0.007** |

**Table 3**. Analaysis of the pre-postinjection VAS differences of GUS subgroups between groups. Significant values are in bold.

hyaluronic acid fillers, it is mentioned that the advantage of linear application over multiple injections is that we can distribute the product more homogeneously with fewer entry points[12].

CIVIT, which is also applied using a cannula, can be easily administered to the posterior third of the vagina. This posterior region of vagina, which is difficult to reach with random needle injection, can be easily reached with CIVIT and regeneration of the entire vaginal mucosa can be achieved.

CIVIT is also a standardised technique. How many points can be entered and how much product can be administered at what intervals can be adjusted, each point can be applied equally and can be applied in the same

| | | Mean square | Df | F | *p* |
|---|---|---|---|---|---|
| VHI | Time | 919.619 | 1 | 329.560 | **0.001** |
| | Grup | 17.482 | 1 | 2.662 | 0.110 |
| | Time*Grup | 57.256 | 1 | 20.519 | **0.001** |
| Desire | Time | 19.350 | 1 | 151.012 | **0.001** |
| | Grup | 4.168 | 1 | 7.935 | **0.007** |
| | Time*Grup | 5.400 | 1 | 42.145 | **0.001** |
| Arousal | Time | 8.959 | 1 | 50.976 | **0.001** |
| | Grup | 0.00004 | 1 | 0.001 | 0.994 |
| | Time*Grup | 0.843 | 1 | 4.797 | **0.034** |
| Lumbrication | Time | 30.196 | 1 | 153.195 | **0.001** |
| | Grup | 0.708 | 1 | 0.687 | 0.412 |
| | Time*Grup | 6.616 | 1 | 33.566 | **0.001** |
| Orgasm | Time | 20.270 | 1 | 85.998 | **0.001** |
| | Grup | 3.997 | 1 | 2.618 | 0.113 |
| | Time*Grup | 2.859 | 1 | 12.130 | **0.001** |
| Satisfaction | Time | 20.061 | 1 | 123.270 | **0.001** |
| | Grup | 6.963 | 1 | 7.590 | **0.009** |
| | Time*Grup | 3.009 | 1 | 18.487 | **0.001** |
| Pain | Time | 46.061 | 1 | 240.933 | **0.001** |
| | Grup | 1.475 | 1 | 2.608 | 0.114 |
| | Time*Grup | 6.264 | 1 | 32.767 | **0.001** |
| Total | Time | 807.170 | 1 | 378.338 | **0.001** |
| | Grup | 80.757 | 1 | 14.032 | **0.001** |
| | Time*Grup | 132.206 | 1 | 61.968 | **0.001** |

**Table 4**. Analysis the relationship between repeated measurements of FSFI scores according to treatment groups. Significant values are in bold.

| | | Preinjection | | Postinjection | | |
|---|---|---|---|---|---|---|
| | | Mean | Std. deviation | Mean | Std. deviation | p |
| VHI | Random N. | 10.810 | 1.990 | 15.667 | 1.742 | **0.001** |
| | CIVIT | 10.087 | 1.952 | 18.174 | 2.774 | **0.001** |
| Desire | Random N. | 3.243 | 0.561 | 3.686 | 0.615 | **0.001** |
| | CIVIT | 3.183 | 0.638 | 4.617 | 0.459 | **0.001** |
| Arousal | Random N. | 2.938 | 0.526 | 3.381 | 0.495 | **0.001** |
| | CIVIT | 2.743 | 0.702 | 3.578 | 0.720 | **0.0001** |
| Lumbrication | Random N. | 2.248 | 0.669 | 2.871 | 0.733 | **0.001** |
| | CIVIT | 1.878 | 0.815 | 3.600 | 0.886 | **0.001** |
| Orgazm | Random N. | 2.943 | 0.826 | 3.543 | 0.751 | **0.001** |
| | CIVIT | 3.009 | 1.091 | 4.330 | 1.021 | **0.001** |
| Satisfaction | Random N. | 2.881 | 0.676 | 3.467 | 0.710 | **0.001** |
| | CIVIT | 3.074 | 0.867 | 4.400 | 0.661 | **0.001** |
| Pain | Random N. | 1.962 | 0.501 | 2.876 | 0.620 | **0.001** |
| | CIVIT | 1.687 | 0.482 | 3.670 | 0.797 | **0.001** |
| Total FSFI | Random N. | 16.214 | 1.769 | 19.824 | 2.103 | **0.001** |
| | CIVIT | 15.678 | 1.656 | 24.196 | 2.334 | **0.001** |

**Table 5**. Analysis the differences of pre-postinjection VHI and FSFI results of both techiques. Significant values are in bold.

way in every patient. However, there is no standardisation in the random needle injection technique and it may not be applied equally to all points due to the return of the product given through the injection holes.

Another important consideration when using HA is that cannula application is safer than needle application. In a study, injection with a sharp needle has a higher risk of intra-arterial injection than blunt cannula[13].

The limitations of our study were the small number of patients and the lack of histology verification. More studies with larger numbers of patients and histology varification are needed.

## Conclusion
In summary, CIVIT, a novel technique, and random injection, a frequently used technique, are both effective for vaginal rejuvenation. However, CIVIT is significantly more effective than the random technique in improving genitourinary symptoms, vaginal health index and sexual function. However, there is a need to prove this efficacy with prospective randomised studies.

## Data availability
The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request. Data are located in controlled access data storage at private archive.

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All methods were carried out in accordance with relevant guidelines and regulations.

## Author contributions
O. L. made project development, data collection or management, data analysis and manuscript writing/editingB.H. P. made project development, data collection and managementE. D. made data collection and management and manuscript writing/editingH. P. made data analysis and manuscript writing/editing.

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## Declarations

## Competing interests
The authors declare no competing interests.

## Ethical approval
This study was conducted as a sub-study of the research project approved by the ethics committee (Maltepe University Medical Ethics Committee) with the number 2021/900/89 as a result of retrospective evaluation of the data. This study performed with 'relevant guidelines or institution name or ethical committee guidelines'. Informed consent was obtained from every participate.

## Additional information
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